SD
11
.A1
A42
no.
466

IMPORTANT FOREST TREES OF THE EASTERN UNITED STATES

UNITED STATES DEPARTMENT OF AGRICULTURE · FOREST SERVICE

IMPORTANT FOREST TREES

OF THE
EASTERN UNITED STATES

From "Trees of North America,"
By C. Frank Brockman.

Illustrations by Rebecca Merrilees.

©1968 Western Publishing Co., Inc.
Used by permission.

FOREWORD

THE FOREST cradled the early form of life that was to become Man, shaping him (many scientists believe) by making it more expedient for him to walk erect and have opposable thumbs. Thus man became an efficient member of the forest community — a superior hunter and gleaner.

Later as he discovered the benefits of agriculture, the forest became an obstacle to be removed. In centers of civilization such as those in Europe and the British Isles, the forests were all but wiped out.

From such areas came the first settlers to America. Their biggest task: clear the forests for fields. Some trees they used; most they piled and burned. The disastrous results in many areas are now familiar stories.

We in America began to realize the need to protect our forests less than a hundred years ago. We began to scientifically manage and wisely use some of our forests around the turn of the century. And finally we are beginning to understand our forests.

Now we must grasp their significance. We must strive to know ahead of time the impact on the forest of every action we take, or don't take. And above all we must try to comprehend what our future on earth would be like if we push our forest resource too far, and what exactly "too far" is.

Almost all knowledgeable people suspect that the human race needs forests for survival. It's time to find out how much, where, and what kind.

TREES are marvelous mechanisms that transform water, carbon dioxide, and a few minerals into structures that are both beautiful and useful.

The most massive living things on earth are trees, yet some species are shrub-like or even vine-like. Trees vary in almost every way imaginable — size, color, shape, form, structure, needs, sensitivity, resistance — yet some species are so similar that trained foresters must seek identity clues in the detail of a leaf-margin.

Trees are controversial because so many people like them — only for different reasons. Trees are a conspicuous and visually pleasing part of the landscape, and some people become very disturbed when trees are killed or cut.

But trees are very useful to man because of the wood products they yield. The many people who harvest, haul, process, manufacture, package, and sell wood in all its forms depend on trees for their livelihood. And who among us doesn't use and enjoy wood? Not one! You're using it now as you read the pages of this booklet.

Who is right? Those who would preserve trees and enjoy them for benefits other than wood? Or those who view trees merely as a source of one of mankind's most versatile and vital materials?

The answer, of course, is "BOTH are right." We need woodlands for our pleasure and we need them for wood. It is the obligation of the land-use planners and land managers to regulate and balance both uses. With proper consideration and concern, planners will determine how best to serve mankind both materially and esthetically.

WOOD is so much a part of our lives that we almost take it for granted. Each of us, each year, uses an average of more than 400 pounds of paper and 200 board feet of timber. Besides paper, we use wood for shelter, fuel, bridges, posts, piling, furniture, fences, wall coverings, handles, toys, toothpicks, matches, crates, boxes, barrels, pallets, and on and on through an almost endless list.

Wood not only has myriad uses, but has the very important advantage over most natural materials in that it is endlessly renewable. It is the yield from a crop that can be harvested and replanted instead of being merely a withdrawal from a shrinking reserve.

Experts predict that the demand for wood will double in America in the next 25-50 years. Today's scientists and researchers are doing much to ensure that present and future generations get the kinds and amounts of wood needed. There are four major goals involved: better utilization of each tree harvested; bigger and better trees through selection and genetics; increased protection against fire, insects, and diseases; and safeguards against the many encroachments that would endanger the forest itself.

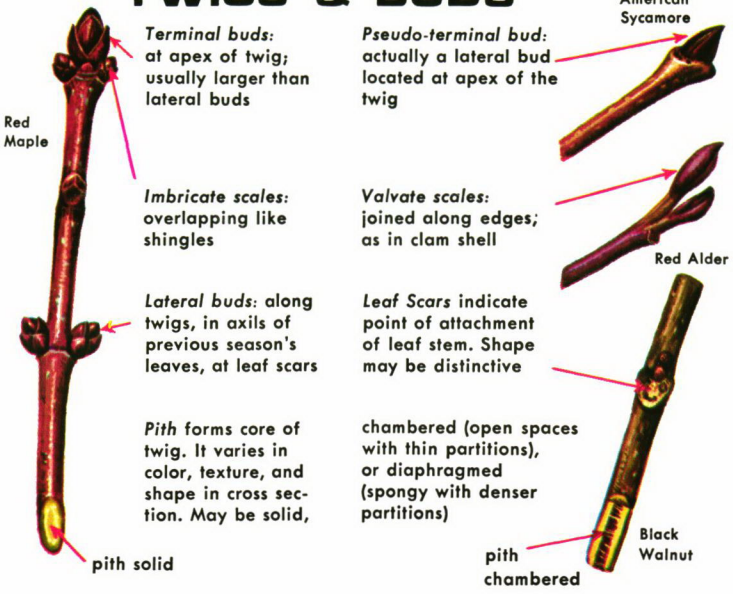
THIS BOOKLET, hopefully, will identify for the reader those forest trees of eastern United States that he will most likely encounter during a woodland visit. Certainly he can easily find many trees not described in these pages.

The selection of species was difficult. Several experts compiled the final list, each finding that the hardest part of the task was in deciding which species to leave out rather than which to include.

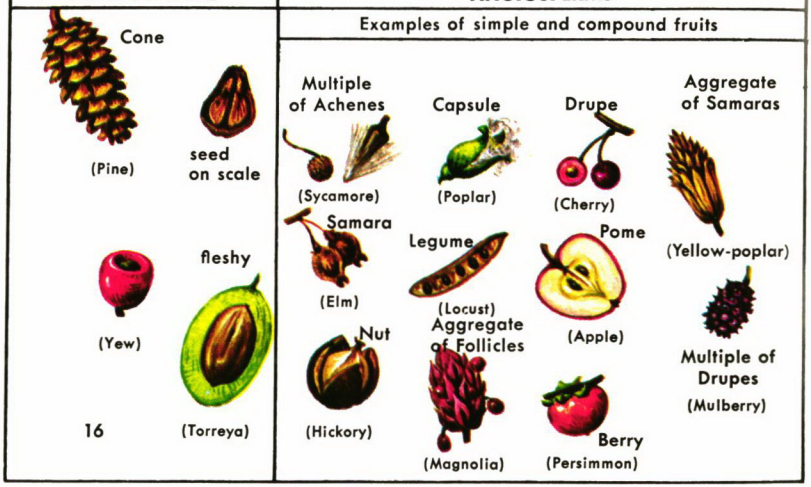
The purpose of this booklet is threefold: to acquaint the reader with the most common forest trees; to help him appreciate the fact that trees are useful as well as beautiful; and possibly to inspire him to further studies of the management, wise use, and development of the forest resource.

IDENTIFICATI

TWIGS & BUDS

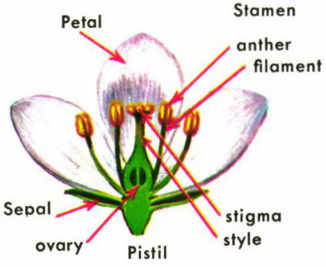

Red Maple
Terminal buds: at apex of twig; usually larger than lateral buds
Pseudo-terminal bud: actually a lateral bud located at apex of the twig
American Sycamore
Imbricate scales: overlapping like shingles
Valvate scales: joined along edges; as in clam shell
Red Alder
Lateral buds: along twigs, in axils of previous season's leaves, at leaf scars
Leaf Scars indicate point of attachment of leaf stem. Shape may be distinctive
Pith forms core of twig. It varies in color, texture, and shape in cross section. May be solid,
chambered (open spaces with thin partitions), or diaphragmed (spongy with denser partitions)
pith solid
pith chambered
Black Walnut

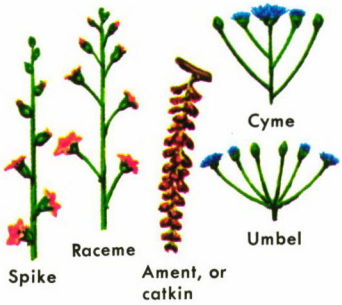
FRUITS



ON FEATURES

FLOWERS





BARK

Smooth Amer. Beech

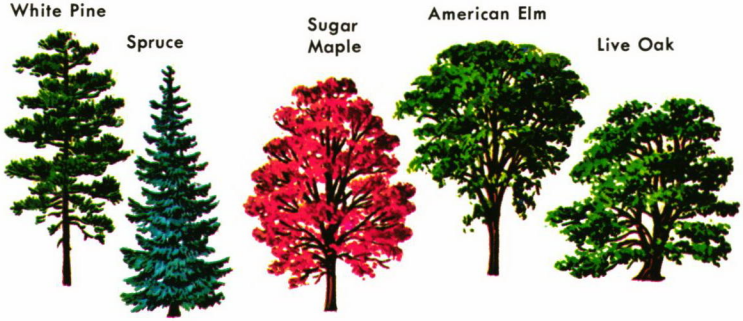
Furrowed Black Oak

Scaly White Pine

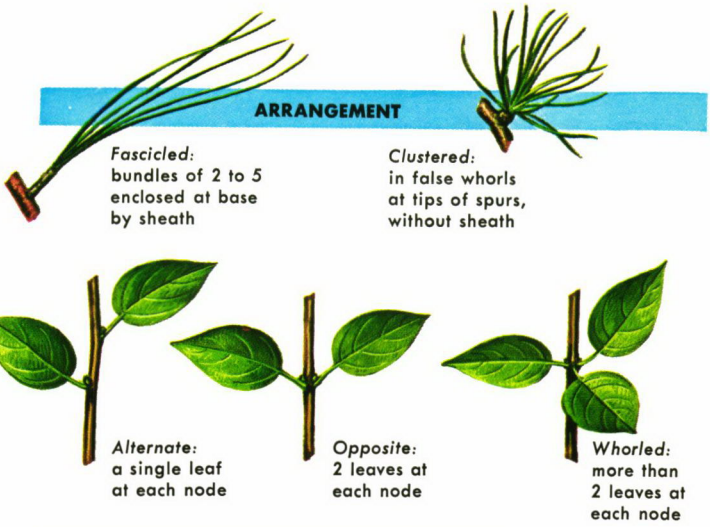
Warty Common Hackberry

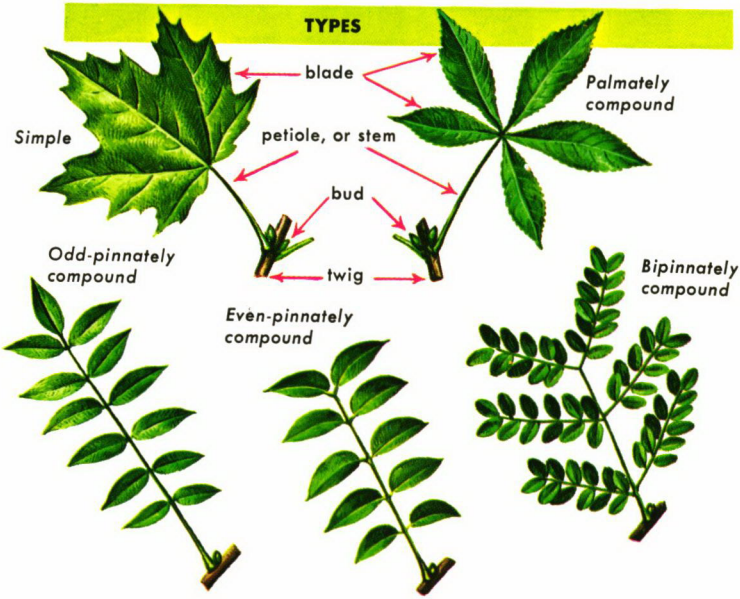
Shaggy Shagbark Hickory

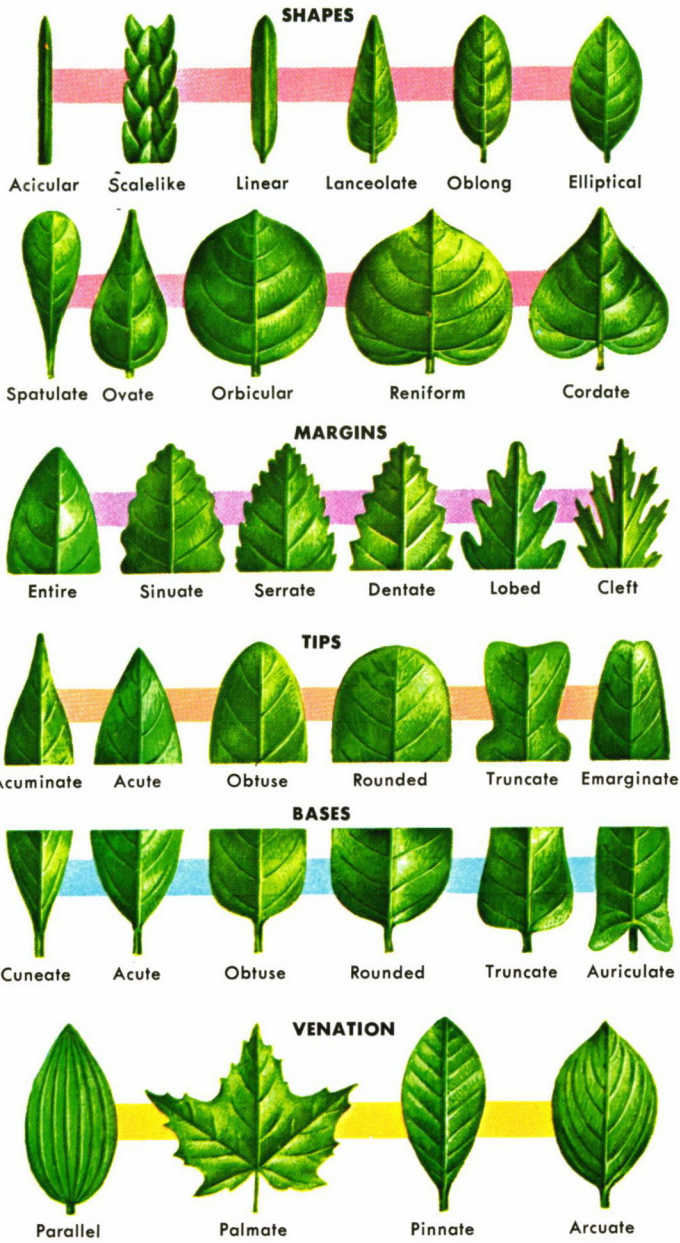
TREE SHAPES



LEAVES may be deciduous (shed annually), or they may be evergreen or persistent (remaining on tree one to many years). Most cone-bearing trees and some broad-leaved trees are evergreen. Leaf arrangement may be obscure at growing tips, where leaves may not have reached full size. Leaves of some trees bear stipules (not shown), small leaflike appendages at base of petiole.






SHAPES
Acicular
Scalelike
Linear
Lanceolate
Oblong
Elliptical
Spatulate
Ovate
Orbicular
Reniform
Cordate
MARGINS
Entire
Sinuate
Serrate
Dentate
Lobed
Cleft
TIPS
Acuminate
Acute
Obtuse
Rounded
Truncate
Emarginate
BASES
Cuneate
Acute
Obtuse
Rounded
Truncate
Auriculate
VENATION
Parallel
Palmate
Pinnate
Arcuate

IMPORTANT TREES OF EASTERN FORESTS

BALDCYPRESS *(Taxodium distichum)* is a tree most often associated with very watery sites such as swamps, often thriving where it stands in water several months of the year. It is one of the most unusual trees of the South, and is easily identifiable by the trunk which flares out at the base into a swollen, deeply-lobed, buttress-like structure. The wide-spreading roots send up woody growths that protrude above the water, sometimes to a height of several feet. The exact function of these characteristic "knees" is still not known.

The light-green, lustrous **leaves** are alternate, two-ranked, and deciduous. Generally ½ to ¾-inch long, the leaves are flat and linear, without stalks, entire, sharp-pointed, and about 1/16th-inch wide.

The fibrous **bark**, ranging in color from light gray to brownish red, divides into flat ridges with shallow furrows as the tree ages. The staminate **flowers**, appearing in March and April, are brownish, 3-5 inches long. The round **cones**, which are born in leaf axils, occur singly or in clusters of two or three, and are about an inch in diameter. Seeds receive light to moderate use as food by gray squirrels and wood ducks.

The baldcypress, its branches often draped with Spanish moss, is to many people a symbol of the great swamps of the deep South. The tree is noted for its long life and the huge sizes it attains. It was once one of the most plentiful trees along drainages of the Southeast, but its value as a source of rot-resistant wood has caused depletion of many merchantable stands.

THE WOOD OF BALDCYPRESS *

Properties — Baldcypress is moderately heavy, moderately hard, moderately strong, and moderately stiff. The heartwood has outstanding durability qualities under conditions favorable to decay. It does not impart taste, odor, or color to food products. Sapwood splits and checks badly, and is not resistant to decay.

Uses — Baldcypress heartwood is used extensively in building construction, especially where high decay-resistance is required. It is used in warehouses, docks, factories, and bridges. It is favored for greenhouses, stadium seats, cooling towers and commercial installations that have high humidity. Other uses are for caskets, sash, doors, interior trim, millwork, paneling, and for containers such as boxes, crates, vats, tanks, and tubs. Heartwood is also used for wooden boats, river pilings, and fencing.

---

*Descriptions of wood and its uses taken from AGRICULTURAL HANDBOOK 101, Forest Service, USDA, 1956.

leaves 2-ranked, deciduous; cones round, disintegrate

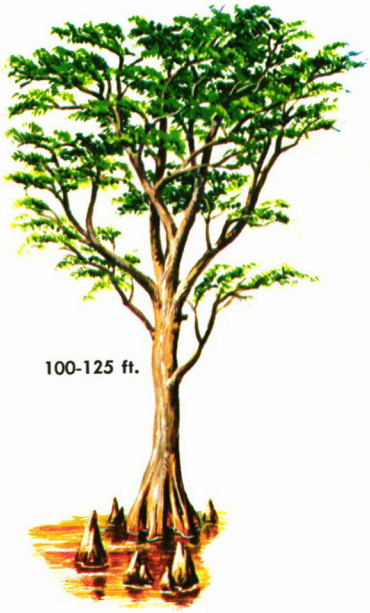
COMPARISONS

needle clusters on spur shoots; deciduous; cones oblong, persist

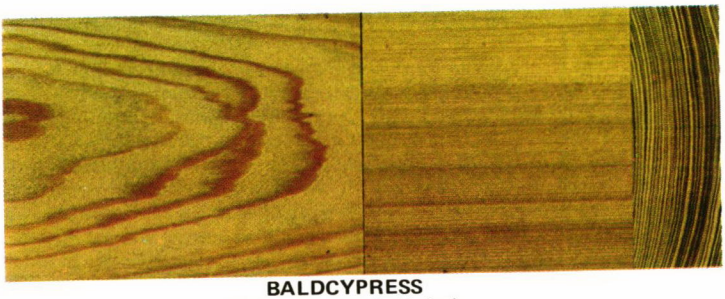
BALDCYPRESS
Taxodium

LARCHES
Larix

BALDCYPRESS



100-125 ft.



BALDCYPRESS
(approximately half-size)

PINES *(Pinus)*

Pines are probably the world's most important conifers. They grow in most areas of the Northern Hemisphere and in a few areas south of the equator. About 100 species are recognized worldwide; 36 of these species are native in the United States.

Pine trees usually have deeply furrowed **bark,** resinous wood, and an upright terminal axis which produces the annual growth in the form of a long shoot with one or more whorls of spreading branches.

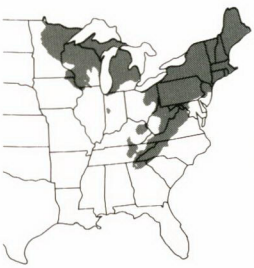
Pines are evergreen, with needlelike **leaves** usually borne in clusters or bundles of 2-5. Leaves remain on the tree from 2 to 12 years, depending upon the species.

Male **flowers** are clustered at the base of the current year's leafy growing shoots in lower portion of the crown. Female flowers occur on the same tree, more often on upper branches.

The **cones** are variously shaped, usually longer than wide, tapering to a point, maturing at the end of the second year (rarely the third), and either falling promptly or remaining attached to the tree for several years. Cones are composed of the hardened, woody scales of the ovulate (female) flowers. Seed are usually winged.

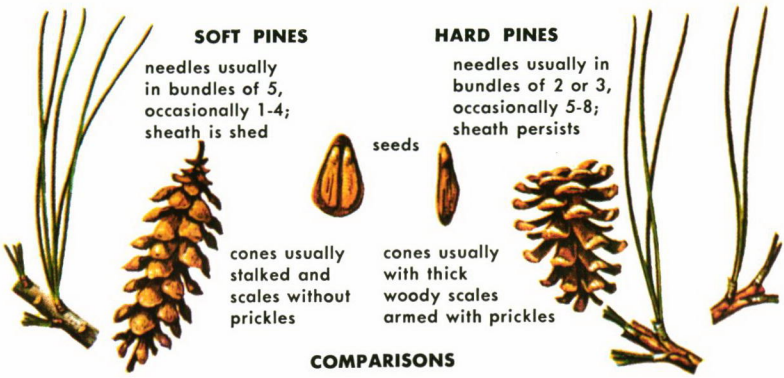
Pines are separated into two groups. The soft (or white) pines are identified by their soft, light-colored, close-grained **wood,** needles in clusters of 5 with the sheath of the needle-bundle being shed with the leaves, cones usually stalked, cone scales not armed with spiny tips. The hard (or pitch) pine characteristics are their coarse-grained, generally darker-colored **wood,** thickened cone scales mostly armed with spiny tips, needles in bundles of 2 or 3 with the sheaths of the bundles not shed, and cones short-stalked or (usually) not stalked.

The only soft pine of eastern forests is the eastern white pine *(Pinus strobus).* All other species fall into the hard pine group.



EASTERN WHITE PINE *(Pinus strobus)*

needles are soft bluish-green, flexible, 3-5 inches long, in bundles of 5, with 3-5 fine white lines (of stomata) on two surfaces of each needle. Needles remain on the tree for two years. Cones are fully grown in the summer of the second season, opening to discharge seed that autumn. **Cones** are 4-8 inches long, curved, stalked, with scales not spiny. The **bark** on young trunks and branches is thin, smooth, greenish (sometimes tinged with red), and lustrous. On old trunks, the bark is deeply divided into broad ridges that are covered with purplish scales. The **tree** commonly attains 100 feet in height and 4 feet in diameter, with a tall, straight stem and pyramidal crown. Branches are in definite whorls of long lateral branches sweeping upward in graceful curves. This is the largest conifer of eastern forests, is long-lived, and has been known to reach heights above 200 feet. The **wood** is light, straight-grained, easily worked, but not strong. It is used in cabinet work, interior finishes, woodenware, matches, and lumber. A large part of the winter diet of red squirrels (boomers) in the southern Appalachians is made up of the seed of eastern white pine.


SOFT PINES
needles usually in bundles of 5, occasionally 1-4; sheath is shed
seeds
HARD PINES
needles usually in bundles of 2 or 3, occasionally 5-8; sheath persists
cones usually stalked and scales without prickles
cones usually with thick woody scales armed with prickles

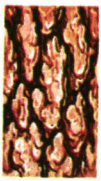
COMPARISONS

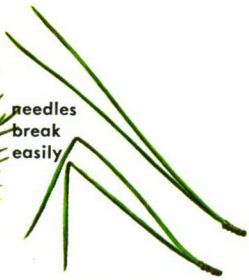
RED PINE *(Pinus resinosa)* **needles** are soft, slender, flexible, lustrous, dark green, 5-6 inches long, and in 2-leaved clusters. **Cones** are symmetrical, ovoid, 2-2¼ inches long, light chestnut-brown and lustrous at maturity, and not armed with spines on the scales. The thick **bark** is divided shallowly into broad, flat ridges that are covered with thin reddish-brown scales. The **tree** usually grows to 70-80 feet in height with a trunk 2-3 feet in diameter. It may reach 100 feet in height; some trees have attained 150 feet in height and 5 feet in diameter. Red pine has a tall, straight trunk and a symmetrical crown. The somewhat pendulous branches almost reach to the ground on smaller trees. This species is an important timber tree. The **wood** is hard, very close-grained, light, and quite strong. It is used among other things for construction, pilings, and flooring.

JACK PINE *(Pinus banksiana)* **needles** are stout, flat, 1-1½ inches long, dark green, deciduous in their second and third years, and in 2-leaved bundles. The **cone** is usually erect, 1½-2 inches long, and generally curved in toward the branch. **Cones** are green or purplish when full-grown, turning light yellowish-brown as they ripen. They may remain on the tree for years. Cone scales are armed with small prickles that are often deciduous. The **tree** is frequently 70 feet tall with a straight trunk about 2 feet in diameter. The branches are long and spreading, forming an open crown that often has a ragged appearance. The wood is soft, light, and not strong. It is used mainly for pulpwood.

PITCH PINE *(Pinus rigida)* **needles** are 3-5 inches long, rigid, dark yellow-green, and marked on 3 faces by numerous fine white lines (of stomata). Needles are in 3-leaved clusters. **Cones** are oval, 1-3½ inches long, and have scales tipped with curved, rigid spines. The **tree** usually grows 50-60 feet tall with trunk diameters of 2-3 feet. The branches are often thick, contorted, and pendulous, giving the tree an irregular, ragged, picturesque crown. The **bark** is broken into thick plate-like scales that are yellowish-brown to reddish-brown on older trees. Pitch pine is usually restricted to the less fertile soils such as the sandy outwash plains of glacial origin, or gravelly soils. The coarse-grained **wood** is very durable. It is sometimes used for lumber, but more largely used for fuel and other minor products. Wild boar in the southern Appalachians dig out the roots of this pine and eat the bark and soft outside wood from them.

50-100 ft.

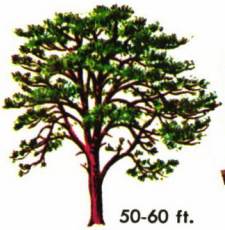




RED PINE

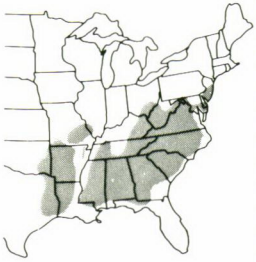
70-80 ft.

JACK PINE



50-60 ft.

PITCH PINE



SHORTLEAF PINE *(Pinus echinata)* **needles** are 3-5 inches long, slender, flexible, dark green, in clusters of 2 or 3. Needles begin dropping at the end of the second season, with some remaining until the fifth year. The symmetrical **cones** are ovoid, short-stalked, 1½-2½ inches long, and armed with a short spine at the tip of each scale. The **bark** is broken into irregularly-shaped plates that are covered with thin, reddish scales. The **tree** grows to 80-100 feet on good sites, with diameters of 2-3 feet. The comparatively slender branches form a loose, pyramidal crown. Seeds are eaten by wild turkey, squirrels, and some songbirds.

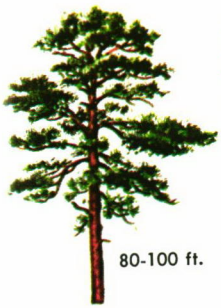
THE WOOD OF THE SOUTHERN PINES

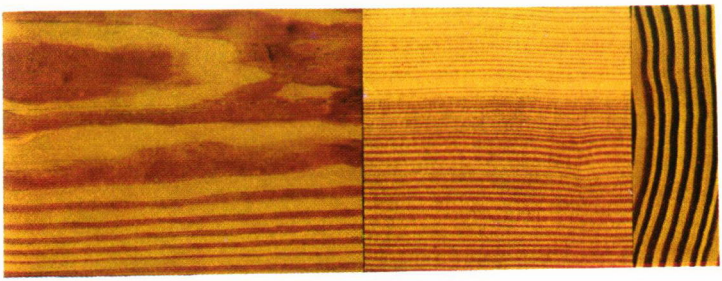
Properties — The woods of the southern pines share many common properties. They are classed as moderately heavy, moderately hard, moderately strong, stiff, and moderately shock resistant. Heartwood is moderately resistant to decay. All southern pines have moderately large shrinkage when drying but stay in place well after they are seasoned. In nail-withdrawal resistance, they rank above hemlock, spruce, and Douglas-fir.

Uses — Southern pine is used mainly for building materials such as framing, sash, sheathing, subflooring, joists, and interior finish. As a result of techniques developed in recent years, much southern pine is cut into veneers for use in construction plywood. It is also used for boxes, crates, caskets, interior parts of furniture, woodenware, and novelties. Considerable amounts go into poles, pilings, crossties, and mine timbers. Much southern pine is cut for pulpwood. Southern pines are used for obtaining wood turpentine, tar, and tar oils through the distillation process.

SLASH PINE *(Pinus elliottii)* is one of the most important pines of southeastern United States, and one of the two species yielding commercial quantities of naval stores. The common name comes from the turpentine face, or "slash" cut into the bark to collect the resinous sap. **Needles** of slash pine are dark green and lustrous, 8-12 inches long, and grow in 2-leaved or 3-leaved clusters. The short-stalked **cones** are 3-6 inches long, pendant, ovoid, and have thin, flat, flexible scales, each tipped with a small spine. The **bark** is gray to reddish-brown, rough, separating on the surface into large, thin scales. The **tree** commonly grows to 100 feet in height with a tall, straight, tapering trunk 2-3 feet in diameter. The stout horizontal branches form a handsome, round-topped crown. The **wood** is heavy and hard, strong, durable, and stiff. Seeds are eaten by wild turkey, squirrels, and some songbirds.

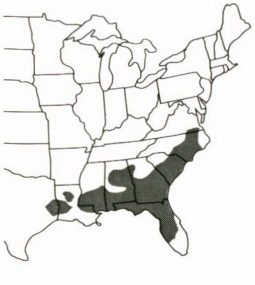
"Typical" slash pine has the scientific name *Pinus elliottii* var. *elliottii*. Another variety grows from central Florida south to the lower Florida Keys. Its name is *Pinus elliottii* var. *densa*.





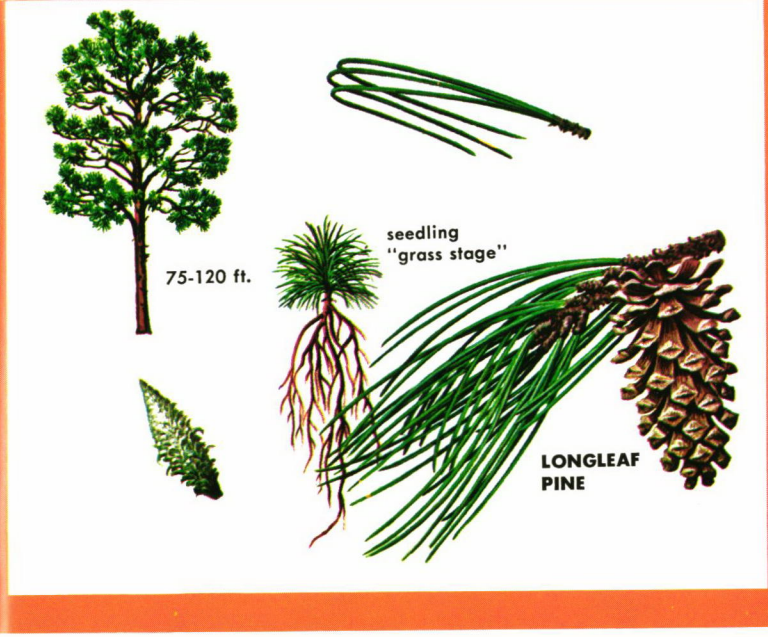
SHORTLEAF PINE
(approximately half-size)

LOBLOLLY PINE *(Pinus taeda)* **needles** are in clusters of 3, slender, stiff, 6-9 inches long, pale green, and deciduous during the third season. The oblong **cones** are 2-6 inches long, light reddish-brown, and armed with a spine at the tip of each scale. Cones drop their seeds in autumn and winter, remaining on the tree for another year. The **bark** of loblolly pine is thick, bright reddish-brown, and divided by shallow fissures into broad, flat-topped plates covered with thin scales. The **tree** often reaches 100 feet in height on a good site, with trunk diameter of 2-3 feet. It has a tall, straight trunk. The short, thick branches are much divided, the lower ones on older trees drooping while the upper ones grow upward. The crown is usually compact and round-topped. Loblolly is considered the principal commercial pine species of the southeastern states because of its wide range, abundance, and adaptability to a variety of sites. It is often called "old field pine" because it seeds into openings very readily. Loblolly seeds are eaten by wild turkeys, squirrels, and some songbirds.



LONGLEAF PINE *(Pinus palustris)* is appropriately named for its long, lustrous, drooping, bright-green needles. The **needles** are 8-18 inches long, and in 3-leaved clusters (sometimes 5-leaved) crowded into dense tufts toward the end of the stout branches. In spring, the large, silvery-white, lustrous buds (called "candles") make longleaf pine easily recognized among other forest trees. The **cone** is the largest of the southern pines, being 6-10 inches long. Cone scales are tipped with spines. The thick **bark** of mature trees in orange-brown or reddish-brown, and separated into large plates with papery scales. The **tree** is commonly 100-120 feet in height on favorable sites, with trunk diameters of 2-2½ feet. It has a tall, straight trunk, and an irregular crown made up of stout, heavy, gnarled or twisted branches. Longleaf is used, along with slash pine, for commercial production of naval stores. The seeds are a favorite source of food for wild turkey and fox squirrels. Hogs root up seedlings and eat bark and soft wood of the tap root.

90-100 ft.
LOBLOLLY PINE


75-120 ft.
seedling
"grass stage"
LONGLEAF
PINE

SPRUCE PINE *(Pinus glabra)* **needles** are dark green, soft, slender, 1½-3 inches long, deciduous between the second and third years, and grow in 2-leaved bundles. The oval-to-round **cone** occurs in clusters of 2 or 3, or occasionally singly. Cones are ½-2 inches long, short-stalked, reddish-brown, lustrous, and armed with a tiny prickle at the tip of each scale. The **bark** of upper trunks and on young trees is smooth, pale gray. On old stems it becomes dark gray to black, irregularly divided into connected, scaly ridges. The **tree** frequently reaches about 70 feet in height with a straight trunk about 2 feet in diameter that may be free of branches for 20-30 feet from the ground.

TABLE-MOUNTAIN PINE *(Pinus pungens)* **needles** are rigid, usually twisted, dark bluish-green, crowded in clusters, 1½-2½ inches long, deciduous in their second and third years, and in 2-leaved bundles. The **cones** are 2½-3 inches long, in clusters of 3 or 4 (sometimes more), light brown, lustrous when ripe, and armed with a stout hooked spine at the tip of each scale. Cones have a very knobby appearance. They may open and shed seeds as soon as they ripen or remain closed on the tree for 2-3 years or longer. The thick **bark** is separated into irregular plates on the lower part of the trunk, the surface of the plates covered with thin, loose, dark-brown scales that are tinged with red. The **tree** is commonly around 60 feet tall in forest stands, with trunk diameters of 2-3 feet. In the open, the tree is 20-30 feet tall with a short trunk and spreading, irregular crown.

POND PINE *(Pinus serotina)* **needles** are in clusters of 3 (occasionally 4), slender, dark yellow-green, flexible, 6-8 inches long, and deciduous in their third and fourth years. The broadly-oval **cones** can be either pointed or rounded at the end; they are 2-2½ inches long, and light yellow-brown at maturity. Scales on the cones are flattened, and each is tipped with a slender, mostly deciduous prickle. Cones remain closed for 1-2 years after maturing, and are persistent on the branches for many years. **Bark** of pond pine is dark reddish-brown, divided by narrow, shallow fissures into small, scaly plates. Pond pine prefers moist-to-wet sites such as those near marshes, swamps, and interstream areas with poor drainage. The **tree** grows to 70 feet in height with a short trunk about 2 feet in diameter. The **wood** is very resinous and heavy; used for lumber and pulpwood.

SPRUCE PINE

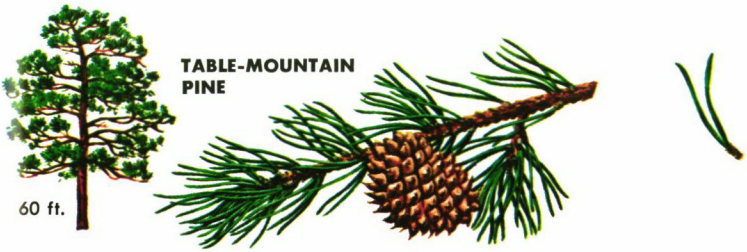
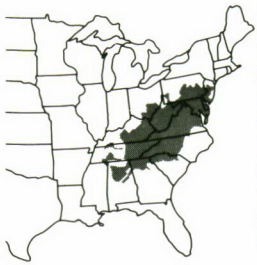


TABLE-MOUNTAIN PINE

60 ft.

POND PINE

25-70 ft.



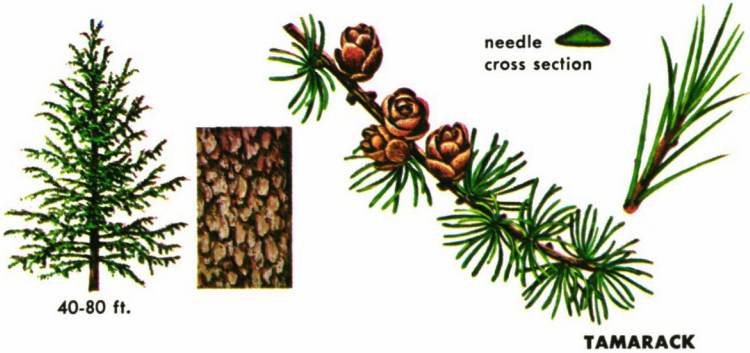
VIRGINIA PINE *(Pinus virginiana)* **needles** are 1½-3 inches long, stout, gray-green, marked with many fine whitish lines (of stomata), and in bundles of 2. **Cones** are dark reddish-brown, ovoid, lustrous, 1½-2½ inches long, and armed with a sharp spine at the tip of each scale. Virginia pine is a small **tree,** 30-40 feet tall, with a trunk rarely more than 18 inches in diameter. The long horizontal branches often droop to form a rather open, ragged, flat-topped crown. The seeds are eaten by wild turkeys, squirrels, and some songbirds.

SAND PINE *(Pinus clausa)* is almost entirely a Florida species. Its largest concentration is in a 280,000-acre block in north-central Florida, where it forms an almost pure forest known as the "Big Scrub." As its name suggests, sand pine grows on soils composed of almost pure sand. Its **needles** are dark green, flexible, slender, 2-3½ inches long, deciduous during their third and fourth years, and occur in 2-leaved bundles. The **cones** are oval-to-conical in shape, 2-3½ inches long, short-stalked or without stalks, and armed with a short prickle at the tip of each scale. Sand pine cones may remain unopened for years, sometimes until the tissue of branches grows up around and covers them. Sand pine is a small, scrubby **tree,** generally 15-20 feet tall with poor form. Exceptional individuals may reach 75 feet in height. Sand pine **wood** is used mostly for pulpwood.

TAMARACK *(Larix laricina)* has one of the widest ranges of all American conifers. Its **needles** are deciduous, ¾-1¼ inches long, soft, flat, and roughly triangular in cross-section. They turn yellow and drop in September or October. Leaves are borne singly or alternate, but often form brushy clusters at the tips of short spur shoots. **Cones** are roughly rounded-oval, ½-¾ inch long, with about 20 scales that are longer than broad. The **tree** is 40-80 feet tall with trunk diameter of about 2 feet. It is most commonly found on moist organic soils such as those in swamps and muskegs. Tamarack often has a narrow pyramidal shape in forest stands, but develops a broad picturesque head in open areas. **Bark** is thin, bright reddish-brown to gray, and scaly. The **wood** is hard, heavy, durable and strong, but difficult to work with tools. It is used for posts, poles, ties, and as construction lumber.

30-40 ft.
VIRGINIA PINE

SAND PINE


needle
cross section
40-80 ft.
TAMARACK

EASTERN HEMLOCK *(Tsuga canadensis)* is a graceful, lacy-foliaged tree of the cool moist forests. The flat **needles** are round-tipped, 1/3-2/3 inch long, and marked on the lower surface with two pale lines. Needles are narrowed to form short, slender stems that grow from rounded, dark orange-colored, persistent, woody pads on the twigs. **Cones** are roughly oval, ½-¾ inch long, with scales about as wide as long. The pendant cones are borne on short, slender stalks from the tips of branchlets, usually remaining on the tree until the following spring. Hemlock is remarkably tolerant to shading by overstory trees, and may remain in the understory in natural stands for 25-200 years. The **tree** is usually 60-70 feet high with a trunk diameter of 2-3 feet. It often has a broad-based pyramidal shape. Ends of branches are often drooping and "feathery." The **wood** is light, soft, brittle, and difficult to work. It is used occasionally for rough or construction lumber, and for pulpwood.

BALSAM FIR *(Abies balsamea)* is a small-to-medium-sized tree that grows in cold, moist climates. The dark green **needles** are ½ to 1 inch long, flattened, mostly 2-ranked (one row on each side of the branch), and marked on the undersides by 2 silvery-white bands. The cylindrical **cones** are erect, dark rich purple in color, 2-4 inches long, with scales longer than broad. **Bark** on old trees is thick, rich brown, and separated into scaly plates. Bark on young trees often has resin blisters. Balsam fir has a symmetrical, slender, pyramidal crown that is quite dense. The **tree** grows up to 60 feet in height, with trunk diameter of 2 feet. The **wood** is light, weak, soft, and coarse-grained. Not much used for lumber, the balsam fir is utilized in the paper industry for pulp. It is planted as an ornamental, and prized for Christmas trees.

FRASER FIR *(Abies fraseri)* is very similar to balsam fir, the minor differences being confined mostly to the **cones.** The scales on the cones of Fraser fir are wider than long, usually about twice as wide as long, while the cone scales of balsam fir are generally about twice as long as they are wide. The bracts of Fraser fir cones are longer than the scales, thus exposing the tips of the bracts which curl downward. Bracts of balsam fir cones are shorter than the scales, and hidden when the cones are closed.

60-75 ft.

EASTERN HEMLOCK

40-60 ft.

lower surface

upper surface

BALSAM FIR

FRASER FIR

SPRUCES *(Picea)*

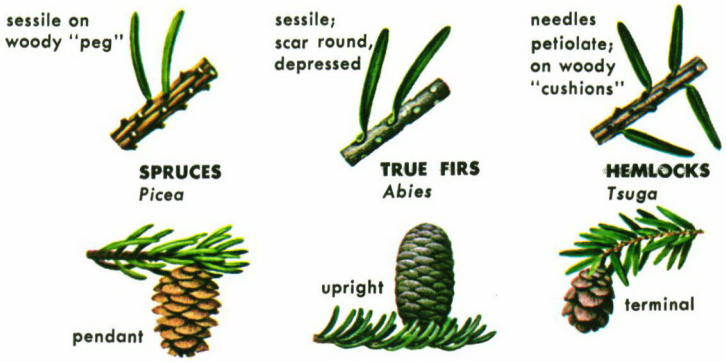
Spruces characteristically are pyramidal, with dense crowns and tall tapering trunks often buttressed at the base. **Bark** is thin and scaly. **Leaves** are linear (needles), evergreen, spiralling around the branches and extending out on all sides of the branches. Needles are 4-angled (flattened in a few species), stiff, and sharp-pointed. They are borne on peg-like stalks which remain on older twigs.

Spruce **cones** hang downward from the branches. The cones are egg-shaped, covered with thin woody scales, and often crowded on upper branches. Each scale bears at its base 2 long-winged seeds.

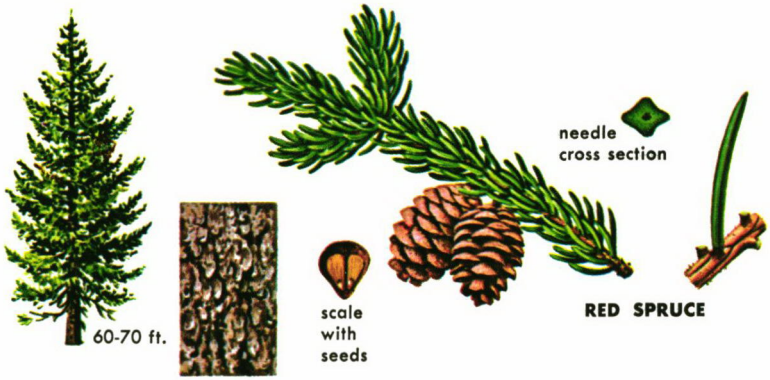
Spruces grow best in moist sites. They are widely distributed in the coniferous forests of cooler climates. Seven of the 30-45 species of spruce are native to the United States; 5 of the 7 are of commercial importance.

BLACK SPRUCE *(Picea mariana)* has blue-green **needles** that are rigid but blunt-tipped. Needles are ¼ to ¾-inch long, 4-sided but somewhat rounder in cross-section than the red spruce or white spruce. The **cones** are oval, pointed, ½-1 inch long, and persistent on the tree for sometimes as long as 20-30 years. Cone scales have rough margins. The **tree** is commonly 30-40 feet tall with a trunk diameter of 1-2 feet. Black spruce is one of the most abundant conifers of northern North America. It prefers wetland sites such as bogs, muck-filled seepages, and edges of streams and swamps. The **wood** is light, soft, and not strong. It is used extensively for pulpwood.

RED SPRUCE *(Picea rubens)* **leaves** are yellow-green, 1/2-5/8 inch long, rather bluntly-pointed, and lustrous. **Cones** are 1¼-2 inches long, with scales that are smooth-margined. Cones are light reddish-brown and lustrous when mature. Cones begin to fall as soon as they ripen, and are all off the tree by the following summer. The **tree** grows to 60-70 feet in height with trunk diameters of 1-2 feet. The dark brown to gray **bark** is broken into irregularly shaped scales, with the reddish inner bark showing between. Red spruce attains its best development in the higher parts of the southern Appalachian mountains. The **wood** is used for lumber and pulpwood.



COMPARISONS



WHITE SPRUCE *(Picea glauca)* **leaves** are crowded on the upper side of the branches by the twisting upward of the needles on the lower side. Needles are ¾-1 inch long, and bluntly pointed. **Cones** are usually about 2 inches long, becoming pale brown and lustrous when mature. Cone scales are flexible and smooth-margined. Cones fall soon after they ripen in autumn, rarely persisting through the winter. The **tree** grows 60-75 feet tall with trunk diameter of 2 feet. Foliage of white spruce has a somewhat disagreeable odor when crushed. The **wood** is used for pulpwood, interior trim, and interior parts of furniture.

NORTHERN WHITE-CEDAR *(Thuja occidentalis)* is often called Arbor Vitae (Tree of Life) when used as an ornamental planting. The flattened **branchlets** have 4 rows of overlapping bright green scales, are much branched, and form horizontal fan-like sprays. Foliage has a spicy fragrance when crushed. Mature **cones** are light red-brown, 1/3-1/2 inch long, oblong, erect, and covered with 6-12 thin, blunt scales that open to the base. The **tree** grows to 40-50 feet in height with a short, often lobed and buttressed trunk 2-3 feet in diameter. The **bark** is gray to reddish-brown, often tinged with orange, and separated into flat connected ridges. The **wood** is light, soft, durable, brittle, coarse-grained, and fragrant. It is used for posts, rails, shingles, and pulpwood. This species is a favorite source of browse for deer and rabbits in northern swamps.

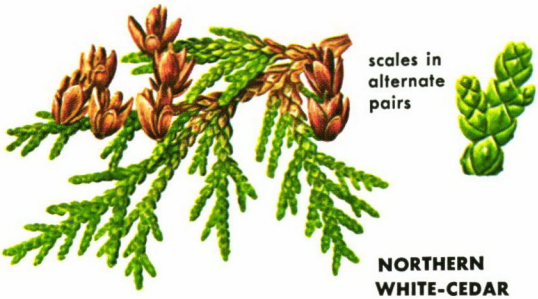
ATLANTIC WHITE-CEDAR *(Chamaecyparis thyoides)* grows only in a narrow coastal belt 50-130 miles wide, from Maine to Florida and westward to Mississippi. The **branchlets** are covered with dark blue-green overlapping scales about 1/8-inch long. The **fruit** is ¼-inch in diameter, bluish-purple when ripe, and with a somewhat crumpled appearance. The **tree** reaches 80-85 feet in height and about 2 feet in diameter. The **bark** is light reddish-brown and peels off in long fibrous strips. Bark is often partially twisted around the trunk. The **wood** is light, soft, close-grained, not strong, and slightly fragrant. It is used for shingles, posts, woodenware, and interior finishes.

---

75 ft.

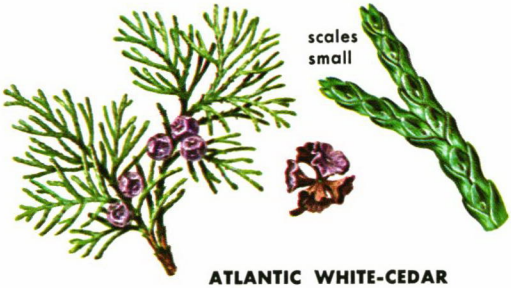
WHITE SPRUCE

40-50 ft.



NORTHERN WHITE-CEDAR

80-85 ft.



ATLANTIC WHITE-CEDAR

EASTERN REDCEDAR *(Juniperus virginiana)* is the most widely distributed conifer of tree size in eastern United States. It grows as a tall tree or a shrub and any size between, utilizing a wide variety of sites from dry hillsides to swamps. The **leaves** are usually opposite, being smooth, shiny, dark green, and glandular on older foliage. On young foliage, leaves are linear (somewhat needle-like), pointed, and prickly. The fleshy **cones** are round, 1/4-1/3 inch in diameter, and at maturity a bluish color with a grayish-white waxy covering. The **tree** is commonly 40-50 feet tall with a trunk diameter of 1-2 feet. The short, slender branches form a compact, pyramidal crown except on very old trees. The **bark** is light reddish brown, thin, and separating into long, peeling, fibrous strips.

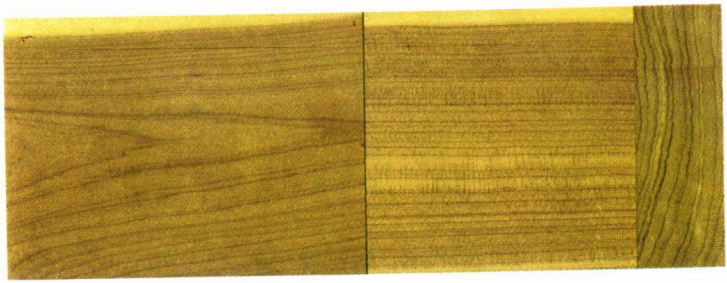
SOUTHERN REDCEDAR *(Juniperus silicicola)* is very similar to eastern redcedar but has smaller cones and drooping branches. Southern redcedar prefers wet lowlands and swamps.

THE WOOD OF EASTERN REDCEDAR

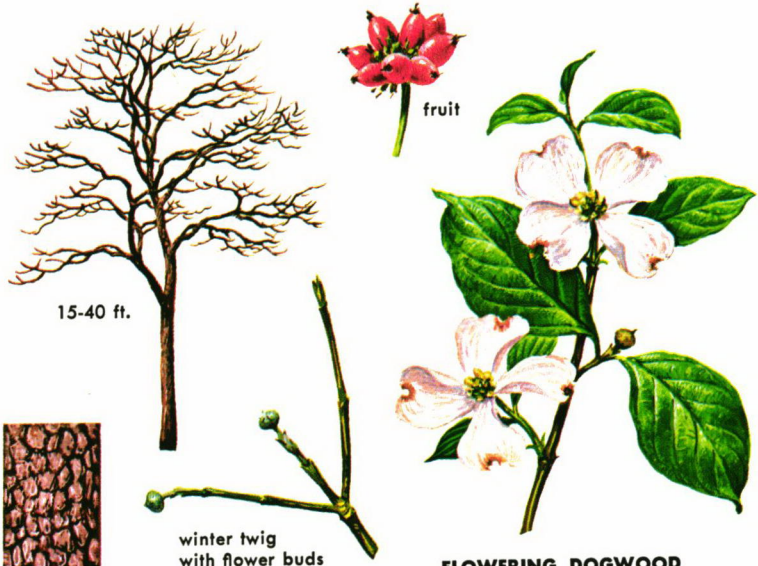
Properties — Eastern redcedar is moderately heavy, hard, moderately weak in bending, and high in shock resistance. The wood is fine-textured and even-grained, with the well-known "pencil cedar" taste and odor. The wood works easily with tools, shrinks very little in drying, stays in place well after seasoning, and is very resistant to decay.

Uses — Eastern redcedar is usually available only in fairly small sizes, and generally is quite knotty. Principal use has changed from fence posts to novelty items. Lumber is used where its fragrance and reputed moth-repellent qualities are valued such as in storage chests, closets, and wardrobes. It is also used for millwork, pencils, woodenware, and containers such as buckets.

FLOWERING DOGWOOD *(Cornus florida)* is named and admired for the white drifts of flowers it adds to the woodlands in early spring. It is a small **tree,** occasionally up to 40 feet in height with a trunk diameter of 12-18 inches. What are thought to be the "flowers" of dogwood are composed of 4 large, white (sometimes pink), petal-like bracts that are notched at the end. The true **flower** is a small, inconspicuous, greenish-white or yellowish, compact head in the center of the showy bracts. The bright-red, oval **fruit** is borne in tight clusters, ripening in October. The **bark** of flowering dogwood is dark red-brown, dividing into small scaly blocks on older trees. Dogwood berries are a favorite fall and winter food of deer, wild turkeys, gray squirrels, and many species of songbirds.



EASTERN REDCEDAR
(approximately half-size)



MAPLES *(Acer)*

Five of the thirteen species of maple native to the United States are important timber trees. Worldwide, there are 115 species of maples *(Acer),* some of which are shrubs.

Almost all maples are deciduous and have opposite, simple, palmately lobed, toothed, long-stemmed **leaves.** In a few species (including boxelder), leaves are pinnately compound.

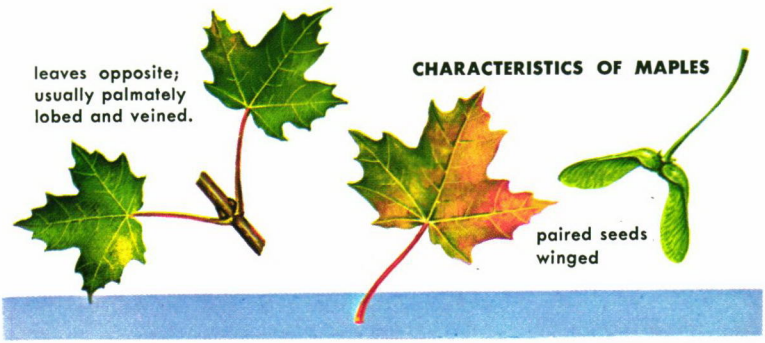
The **fruit** occurs as paired, winged seeds that are often U-shaped or V-shaped, ripening in spring or fall. Each winged portion is a single 1-seeded fruit (samara). Fruit is borne in lateral or terminal clusters.

SUGAR MAPLE *(Acer saccharum)* is one of the largest and most important hardwoods of eastern forests. It is widely distributed, but not found in the South Atlantic or Gulf Coastal Plain states. The **leaves** have 5 lobes that are separated by rounded, shallow sinuses. Leaves are 3-5 inches across, rounded at the base, with sparse, large, pointed teeth on the margins. In autumn, sugar maple leaves are exceptionally colorful with brilliant reds and yellows. **Flowers** are yellow, polygamous, and occur on long, slender stems in clusters up to 3 inches long. They appear with the leaves in spring. The **fruit,** a U-shaped pair of winged seeds, ripens in the fall. The **tree** grows 75-100 feet in height with a trunk diameter of 3-4 feet. In crowded stands, sugar maple develops a tall, straight trunk and a narrow crown. Open-grown trees have a shorter stem and rounded crown. The **bark** of mature trees is thick, light gray to brown, and broken by vertical furrows into plate-like scales. The sap is used to make maple syrup and maple sugar. Sugar maple is a popular shade and ornamental tree.

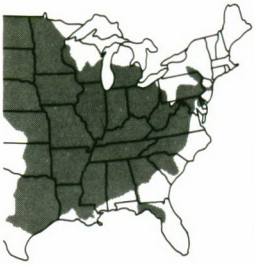
THE WOOD OF THE HARD MAPLES

Properties — The wood of all hard maples is similar. It is heavy, strong, stiff, and has high resistance to shock. Shrinkage during seasoning is large. It has high resistance to nail-withdrawal, and is intermediate in ease of gluing. It takes stain satisfactorily and polishes well. Although usually straight-grained, maple occasionally has curly, wavy, or "bird's-eye" grain. The wood turns well on a lathe and is very resistant to abrasive wear. It has no characteristic taste or odor.

Uses — Maple wood is used principally for lumber, distilled products, veneer, crossties, and pulpwood. About 90 percent of the lumber is remanufactured into such products as flooring, furniture, boxes, crates, handles, interior finish, cabinets, woodenware, and novelties. It is especially suitable for bowling alleys and dance floors. It is distilled to make acetic acid and wood alcohol.



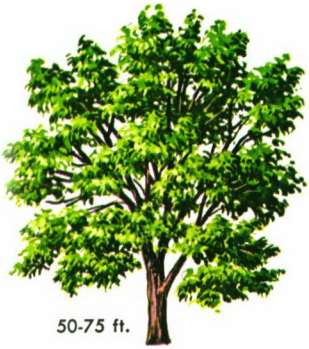
SUGAR MAPLE
(approximately half size)



BOXELDER *(Acer negundo)* **leaves** are opposite (as are all maple leaves) but are odd-pinate, with 3-9 coarsely-toothed leaflets. The terminal leaflet is sometimes shallowly lobed. The **flowers** are small and yellowish-green, dioecious (male and female on different trees), and appear before the leaves do. The **fruit** occurs in V-shaped, winged pairs, forming long, drooping clusters that remain on the tree through the winter. The **tree** grows to 50-70 feet in height and 2-4 feet in diameter. It often divides near the ground into numerous branches that form a wide-spreading crown. Boxelder prefers moist sites, but adapts to a variety of conditions. The **bark** is pale gray or light brown, deeply divided, and with broad, scaly ridges.

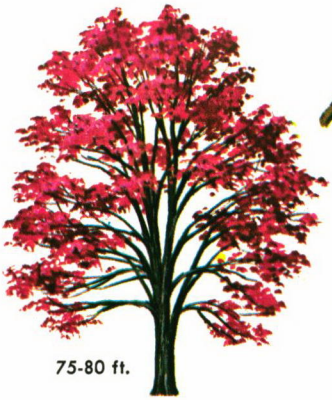
RED MAPLE *(Acer rubrum)* **leaves** are 3-5 lobed, and have coarsely-toothed margins. Leaves are 2-6 inches long and somewhat broader than long. They turn brilliant scarlet, orange, or bright yellow in autumn. The polygamous **flowers** occur in short-stemmed clusters in springtime before the leaves appear. The paired, winged **fruit** is reddish, V-shaped, and ripens in late spring or early summer on drooping stems 3-4 inches long. On old trunks, the **bark** is thick, dark gray, and separated by vertical ridges into large plate-like scales. The **tree** may reach 120 feet in height and 5 feet in diameter under ideal conditions. Commonly it grows to 75-90 feet tall with diameters of 1½-2½ feet. Red maple is often planted as an ornamental. The buds and samaras are a primary food source for gray squirrels in late winter and early spring. Sprouts are a favorite deer browse.

SILVER MAPLE *(Acer saccharinum)* **leaves** are deeply separated into 5 doubly-toothed lobes, the center lobe of the 5 sometimes 3-lobed. Leaves are 6-7 inches across, bright green on the upper surfaces, silvery white below. The bright red petioles are slender and drooping, up to 4-5 inches long. The greenish-yellow polygamous **flowers** are short-stemmed and occur in clusters in early spring long before the leaves appear. The paired, winged **fruit** (samara) is the shape of a broad V. The **tree** prefers moist sites, growing rapidly and attaining heights of 75-120 feet and trunk diameters of 2-4 feet. The **bark** of young trees and branches of older trees is smooth light gray. On old trunks, it is thick (½-¾ inch), reddish-brown, furrowed, and separating into large, thin scales attached in the center and pulling loose at the ends, giving the tree a ragged look. Silver maple is a favorite shade tree but its leaves are not colorful in autumn.



50-75 ft.

BOXELDER



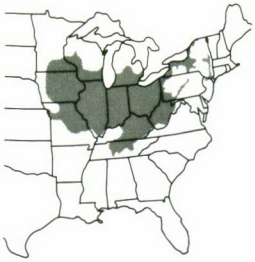
75-80 ft.

RED MAPLE

young trunk

old trunk

SILVER MAPLE



BLACK MAPLE *(Acer nigrum)* has 3-lobed **leaves** (occasionally 5-lobed), each lobe being abruptly sharp-pointed. Leaves are 5-6 inches long, and have downward-drooping sides. The **bark** on old trees is deeply furrowed and often almost black. Other characteristics of black maple that distinguish it from sugar maple are very slight. Black maple is also a source of sap for syrup and sugar. The **tree** commonly grows to 80 feet in height, with trunk diameters of 2-3 feet.

ASHES *(Fraxinus)*

White, black, and green ash are the most important of the 16 ashes native to the United States. All three species occur in eastern forests.

All species of ash have opposite, odd-pinnately compound **leaves** (with single terminal leaflets), each leaf having 3-11 leaflets that usually have toothed margins. Leaves are deciduous.

Some ashes are dioecious (male and female flowers on separate trees) while others are polygamous (with both sexes on the same tree). **Flowers** are borne in terminal or lateral branched clusters in spring before or at the time the trees leaf out.

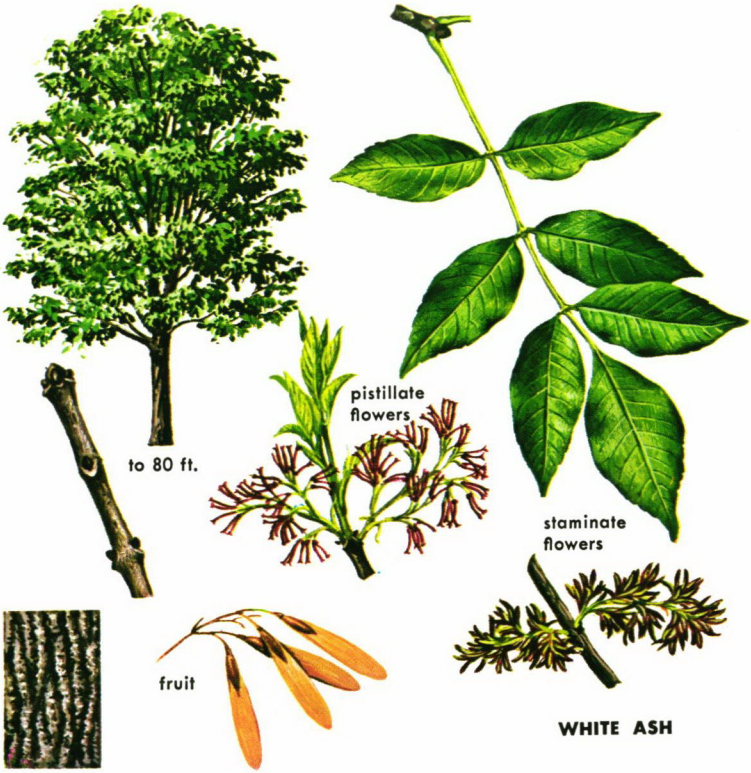
The **fruit** of all ash species is a single-winged samara with a single seed (rarely 2 or 3 seeds). The fruit is usually borne in clusters on slender stems, maturing and falling in late summer and autumn.

Winter buds of ash are blunt, with 1-3 pairs of exposed scales. The terminal bud is larger than the others. Leaf scars are half-round and notched on the upper margin.

The **bark** is thick, furrowed or scaly, and usually ash-colored on branchlets. Some species of ash are classed as shrubs.

WHITE ASH *(Fraxinus americana)* is the largest and commonest of the ashes, and the most useful. The **leaves** are 8-12 inches long with 5-9 (usually 7) oblong leaflets 3-5 inches long that have smooth or finely-toothed margins. Upper surfaces of leaves are dark green and smooth; undersides are pale light green to whitish. The dioecious **flowers** open before the leaves in late spring, and occur in compact panicles. The **fruit** is 1-2½ inches long, and grows in crowded clusters 6-8 inches long. The **tree** may grow to 120 feet in height, but is commonly 70-80 feet tall with trunk diameters around 3 feet. The ashy-gray to brown **bark** is deeply divided by narrow ridges into net-like patterns.

BLACK MAPLE



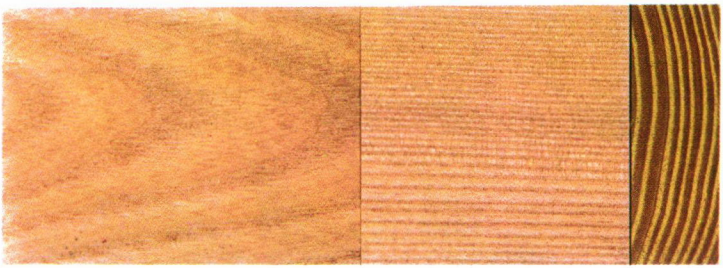
WHITE ASH

THE WOOD OF WHITE ASH

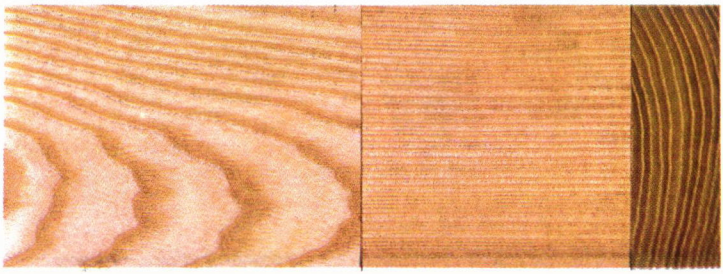
Properties — White ash wood is heavy, hard, strong, stiff, has good shock resistance and excellent bending qualities. It holds screws and nails moderately well, but has a tendency to split. White ash lumber kiln-dries satisfactorily and holds its shape well after seasoning, but has low resistance to decay. The wood stays smooth under constant rubbing. White ash is sometimes confused with hickory, but the two woods are quite easily distinguished. The summerwood (darker) zone in ash has white dots or lines that can be seen with the naked eye; hickory also has these dots or lines in the summerwood, but they are not visible without magnification.

Uses — Much white ash wood is used for handles. It is the standard wood for D-handles for shovels and spades, and for the long handles of forks, hoes, rakes, and shovels. It is used in furniture, especially in the bent parts of chairs. It is used for slack cooperage and many types of sporting equipment including oars and bats.

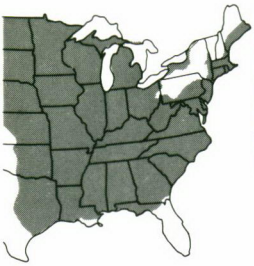
BLACK ASH *(Fraxinus nigra)* **leaves** are 12-16 inches long with 7-11 pointed-oval, finely-toothed leaflets. Leaflets are smooth dark-green above, and paler below. **Flowers** are polygamous and appear before the leaves. The **fruit** (samaras) occurs in open panicles 8-10 inches long. Samaras are 1 to 1½ inches long, oblong, and with the thin wing extending below the center of the seed cavity. The seed cavity is indistinct in black ash. This species typically grows along streams, in bogs, and in poorly drained sites with high water tables. It grows most commonly in peat soils. However, it occurs on fine sands and loams underlain by clays where the surface drainage pattern causes high level of water table. The **trees** grow 60-70 feet in height (sometimes taller on the better sites) with trunk diameters of 1-2 feet; The slender upright branches form a narrow crown.



WHITE ASH
(approximately half-size)



BLACK ASH
(approximately half-size)



GREEN ASH *(Fraxinus pennsylvanica)* **leaves** are 6-9 inches long with 7-9 leaflets 3-4 inches long. The margins of leaflets are toothed, but only from the middle of the leaf to the pointed tip. **Flowers** are dioecious, appearing after the leaves. The **tree** commonly grows to 50-60 feet in height. Green ash is the most widely distributed of the ashes.

PUMPKIN ASH (*Fraxinus profunda*) **leaves** are 9-18 inches long, made up of 7 (sometimes 9) tapered-oval leaflets 5-10 inches long. Margins of leaflets are smooth or minutely toothed. The winged **fruit** (samara) is slender and notched at the tip, which is either rounded or flat. **Flowers** are dioecious, occuring in elongated branched panicles. Samaras grow in long, drooping, many-fruited clusters 2-3 inches long. Pumpkin ash inhabits swamps that are flooded several months of the year. The **tree** attains heights of 120 feet and trunk diameters of 3 feet or more. The base of the slender trunk is often much swollen and buttressed when growing in water.

YELLOW BUCKEYE *(Aesculus octandra)* **leaves** are deciduous, palmately compound with 5 (sometimes 7) broad-oval, pointed leaflets 4-6 inches long. Margins of leaflets are coarsely toothed. Leaves turn yellowish-golden color in autumn. **Flowers** are pale yellow and appear in erect panicles 5-6 inches long in April and May. The **fruit** is a smooth-surfaced, uneven pod 2-3 inches long, bearing 2 large, brown, shiny nuts 1½-2 inches wide. Seeds contain a poisonous substance known as aesculin. Yellow buckeye grows best on bottomlands and on the deep soils of the North Carolina and Tennessee mountains. The **tree** will grow occasionally to 90 feet in height (commonly to 50-80 feet) with a tall clean trunk 2½-3 feet in diameter. It is the largest of the native buckeyes, and is one of the first trees to leaf out in spring. The **bark** is dark brown, scaly, and divided by shallow fissures. The **wood** is light, soft, and close-grained. It is used for pulpwood, woodenware, and sometimes for lumber.

GREEN ASH

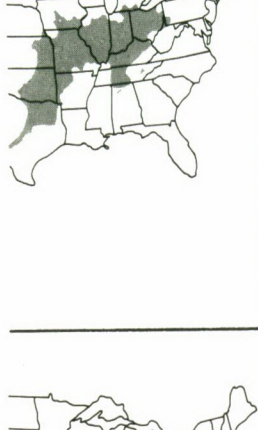
PUMPKIN ASH

50-90 ft.

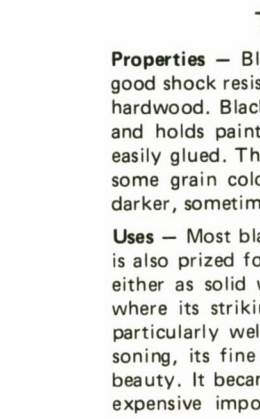
capsular fruit

seeds

YELLOW BUCKEYE



OHIO BUCKEYE *(Aesculus glabra)* has deciduous, palmately compound **leaves** with 5-7 narrow-oval, conspicuously-veined, toothed leaflets 4-6 inches long. **Flowers** are pale yellow-green, not showy, appearing in April and May in clusters 5-6 inches long and 2-3 inches wide. The **fruit** is a spiny capsule about 2 inches long containing 2 dark-brown, shiny seeds, each having the characteristic "eye." Seeds and bark of Ohio buckeye are reported to be poisonous. Twigs and leaves have an unpleasant odor when crushed, giving another common name to the species, "fetid buckeye." The **bark** is thick, ashy gray on older trees, becoming densely furrowed and developing large thick, warty plates. The **tree** may reach 70 feet in height and 2-3 feet in diameter, but usually is much smaller (generally around 30 feet in height). The **wood** is light and soft, being used for pulpwood, woodenware, and occasionally for lumber.



BLACK WALNUT *(Juglans nigra)* **leaves** are deciduous, alternate, pinnately compound, 12-24 inches long, with 15-23 sharply-oval, toothed, long-pointed leaflets 3-3½ inches long. Leaves turn bright, clear yellow in autumn. The **fruit,** borne singly or in pairs, is globular, pointed at the apex, 1½-2 inches in diameter with a thick yellow-green fibrous husk. The hard, woody nut is dark brown, oval to oblong, 1-1½ inches in diameter, and deeply divided on the outer surface into irregular ridges. The nutmeats are sweet and edible, and are a favorite food for red and gray squirrels. Black walnut develops best on deep, well-drained soils, and thrives in well-drained bottomlands and coves of the Appalachians. The **tree** reaches 100 feet in height and 2-3 feet in diameter.

THE WOOD OF BLACK WALNUT

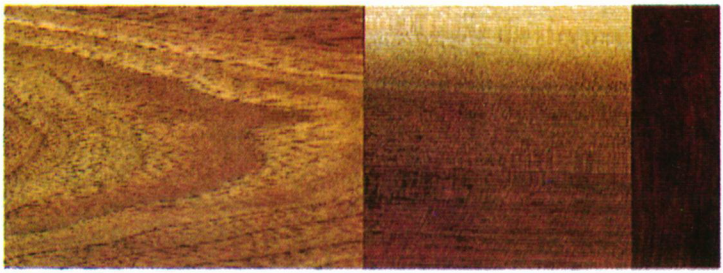
Properties — Black walnut wood is heavy, hard, strong, stiff, and has good shock resistance. The heartwood is one of the most durable of any hardwood. Black walnut works easily with hand or machine tools, takes and holds paints and stains exceptionally well, is readily polished and easily glued. The wood finishes beautifully with an outstandingly handsome grain color and pattern. The heartwood is chocolate brown or darker, sometimes with purplish streaks.

Uses — Most black walnut goes into furniture of the highest quality. It is also prized for gunstocks and interior finishes. In furniture, it is used either as solid wood or as veneer. It is popular for any interior finish where its striking grain and color create special effects. The wood is particularly well suited to gunstocks because of its stability after seasoning, its fine machining qualities, its uniformity of texture, and its beauty. It became popular in Colonial days as an imitation of the more expensive imported mahogany.

OHIO BUCKEYE

70-100 ft.

BLACK WALNUT



BLACK WALNUT
(approximately half-size)

BUTTERNUT *(Juglans cinerea)* has deciduous, alternate, pinnately compound **leaves** 15-20 inches long with 11-17 pointed-oblong, finely-toothed leaflets 2-3 inches long. Leaflets are downy on the undersides. The terminal leaflet is stalked in butternut, but not in black walnut. The **fruit,** borne in drooping clusters of 3-5, is oval, 1½-2½ inches long, greenish-brown, and sticky on the surface of its thick husk. The **nut** is oval, light brown, long-pointed, and many-creased on the hard surface. The nutmeat is sweet. Butternut grows best on streambanks and on well-drained soils but occurs most frequently in coves, on slopes, and on terraces. It is not a common tree in any area. It is a fast-growing species on favorable sites. The **tree** rarely attains more than 100 feet in height and 3 feet in diameter. It often divides 20-30 feet from the ground into stout limbs that form the wide-spreading, round-topped crown typical of open-grown trees. The **wood** is light, soft, and not strong. It is used for interior finishes and furniture.

HICKORIES *(Carya)*

Hickories are an important segment of the hardwood forests of eastern United States, and are limited to those forests east of the Great Plains. Of the 15 species of hickories, eight are considered commercially important in the United States.

The **leaves** of all hickories are deciduous; they are compound, alternate, and odd-pinnate (with a terminal leaflet). Each leaf will have 3-17 roughly oval, pointed, toothed leaflets that are aromatic when crushed. Staminate **flowers** are 3-branched, slender, drooping catkins. The **fruit** is an edible nut, and an important source of food for squirrels. They are often preferred over acorns. In heavy mast years, they provide food through most of the winter. Sometimes they are eaten by wood ducks and mallards. The **trees** have smooth gray bark that becomes very rough and scaly on older trees, often separating into long strips. Pecans, both wild and cultivated, are members of this genus.

COMPARISONS

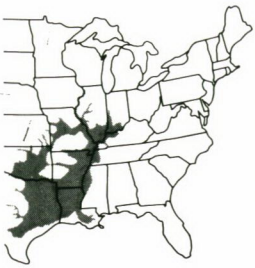
WALNUTS *Juglans*

HICKORIES *Carya*

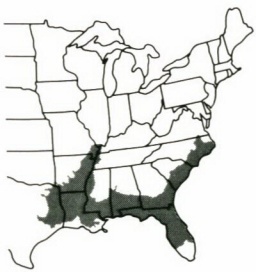
THE WOOD OF HICKORIES

Properties — The wood of true hickories is very heavy, very hard, very strong, and very stiff. It has exceedingly high resistance to shock. There are some woods that are stronger than hickory and some that are harder, but the combination of strength, toughness, hardness, and stiffness found in hickory wood is not found in any other commercial wood. Hickory has very large shrinkage and must be carefully seasoned to avoid checking and warping, but can be glued satisfactorily. The woods of most of the hickories have similar properties.

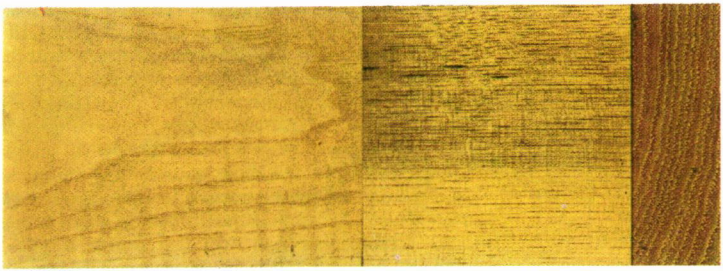
Uses — About four-fifths of all hickory wood goes into the manufacture of tool handles, for which use no other wood is as well suited. It is also used in agricultural implements, athletic goods such as bats, and interior parts of furniture.



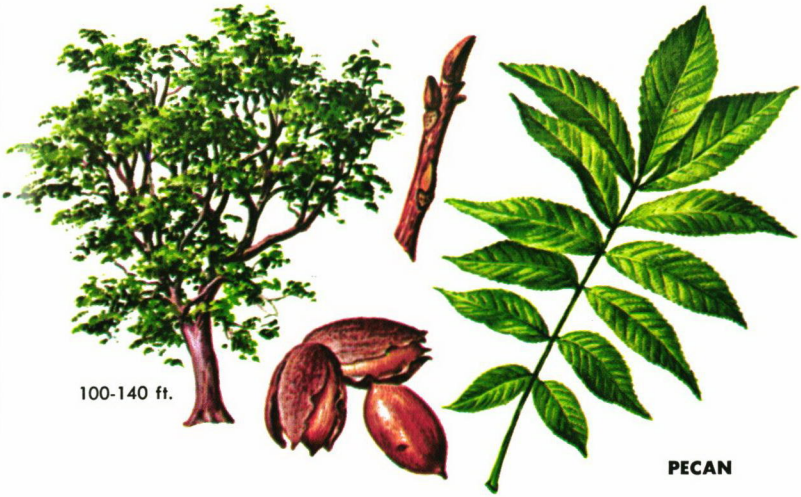
PECAN *(Carya illinoensis)* **leaves** are 12-20 inches long with 9-17 oblong, long-pointed, coarsely-toothed leaflets. The oblong **nut** is smooth, reddish-brown, sharp-pointed, with a 4-sectional dark brown husk that splits open when the fruit is ripe. Pecan is a bottomland hardwood. It is the largest of the hickories, attaining heights of 100-180 feet and diameters that occasionally reach 6-7 feet. Open-grown trees have a spreading crown but those in dense stands prune themselves quite well and develop compact, pyramidal crowns. Pecan finds its chief value as a source of nuts rather than wood, but forest-grown pecan is now prized as furniture stock. Pecan nuts are a favorite food of all squirrels, wild turkeys, bluejays, and crows.



WATER HICKORY *(Carya aquatica)* is common in moist-to-swampy sites, inhabiting low, wet flatlands of the Coastal Plain and the Mississippi River Valley. **Leaves** are 9-15 inches long with 7-13 long-pointed, finely toothed, narrowly-oval leaflets that are 3-5 inches long. Leaflets are often curved or twisted. The **nut** occurs in clusters of 3-4, has a flattened-oblong shape, and a 4-part husk that usually splits open only to about half the length of the nut. The nutmeat is bitter. The **tree** may reach 100 feet in height on good sites and have a diameter of 3 feet or more. Water hickory tends to have a tall, straight trunk, and slender, upright branches that ascend sharply to form a narrow head. **Wood** is used for fencing, gates, and fuel.



HICKORY
(approximately half-size)



PECAN

WATER HICKORY

BITTERNUT HICKORY *(Carya cordiformis)*

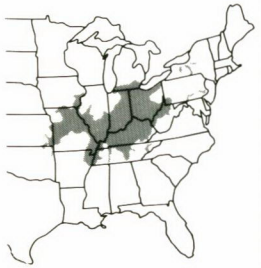
leaves are 6-10 inches long with 7-9 long-oval, toothed leaflets that are dark yellow-green above and lighter below. The 4-ribbed **nut** is about an inch long, roughly spherical but often broader than long. The nutmeat is very bitter. The husk is 4-winged from the tip to about the middle, and covered with yellowish scales. The tree is probably the most abundant of the hickories, and found throughout eastern United States. It prefers rich moist sites such as bottomlands, there developing into a handsome tree 100 feet or more tall with a straight trunk 2-3 feet in diameter.

NUTMEG HICKORY *(Carya myristicaeformis)*

leaves are 7-14 inches long with 5-9 narrowly-oval, toothed leaflets 4-5 inches long that are silvery white and lustrous on the undersides. The **nut,** usually borne singly, is broadly oval, 1½ inches long, and with a heavily 4-ridged husk that is coated with a yellow-brown fuzz. The nutmeat is sweet. The **tree** prefers rich moist soils of bottomlands and riverbanks but is of scattered occurrence, becoming more abundant in southern Arkansas and in central Alabama. It attains 80-100 feet in height with a tall, straight trunk about 2 feet in diameter. The slightly spreading branches form a comparatively narrow crown in forest stands.

MOCKERNUT HICKORY *(Carya tomentosa)*

leaves are 8-12 inches long with 7-9 thin, sharp-pointed, finely-toothed leaflets that are dark green above and hairy orange-brown below. The **nut** is roundish to oval, 1½-2 inches long, with a thick reddish-brown husk that splits almost to the base of the nut when ripe. The nutmeat is sweet. The end bud of the twig is large, usually ½-inch or more in length. The **tree** is found on drier soils of ridges and hillsides where it occasionally reaches 100 feet in height and 3 feet in diameter.



SHELLBARK HICKORY *(Carya laciniosa)*

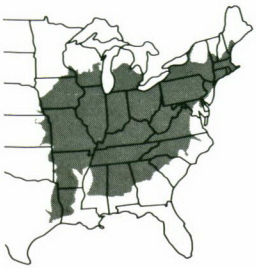
leaves are 15-22 inches long with 5-9 (usually 7) oval to oblong, finely-toothed leaflets 5-9 inches long that are lustrous dark green above and paler below. The round-to-oblong **fruit** is 1½-2½ inches long, borne singly or in pairs, and covered with a thick woody husk. The nutmeat is sweet. The light-gray **bark** separates into broad, thick plates often 3-4 feet long that remain on the trunk for years, giving the tree a rough, shaggy appearance. Shellbark hickory is essentially a species of well-drained bottomlands. The **tree** attains heights of 120-140 feet and diameters of 3-4 feet. It has a straight, slender trunk that is often free of branches for more than half its height.

BITTERNUT HICKORY

NUTMEG HICKORY

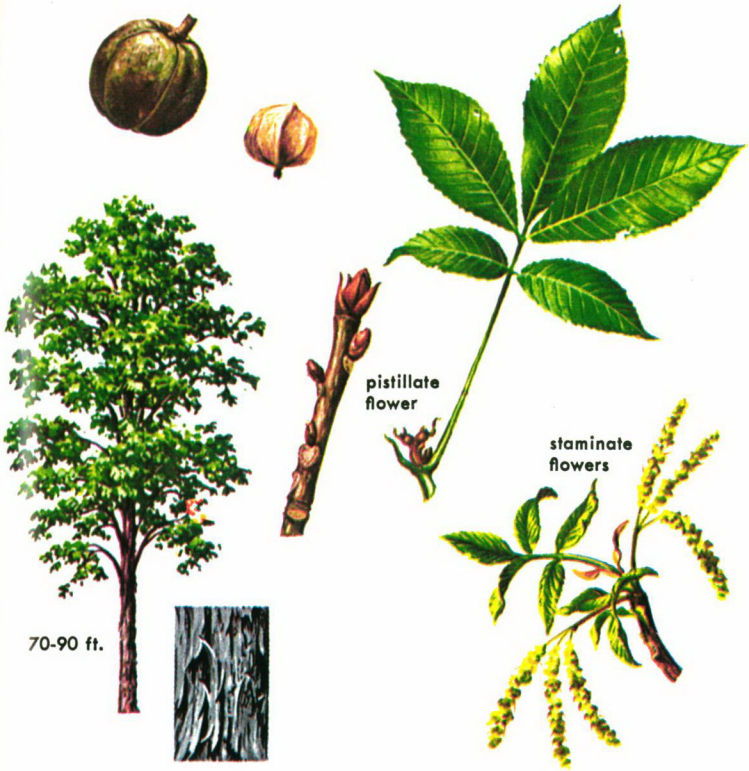
MOCKERNUT
HICKORY

SHELLBARK
HICKORY

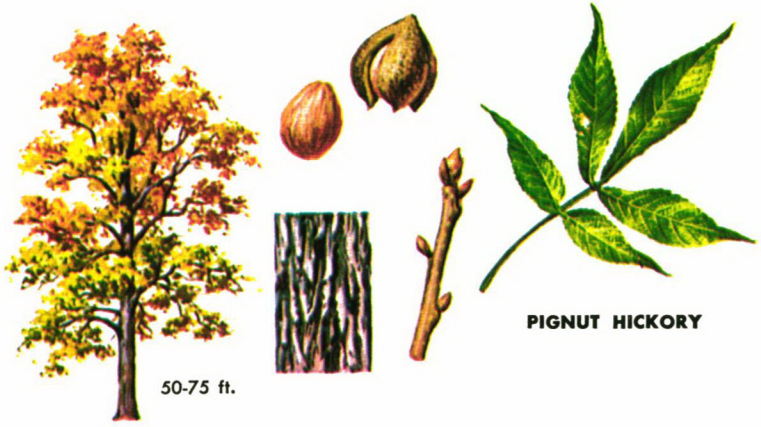


SHAGBARK HICKORY *(Carya ovata)* **leaves** are 8-14 inches long with 5 (rarely 7) tapered-oval, finely-toothed leaflets. The terminal leaflet is largest, being 5-7 inches long and 2-3 inches wide. The **nut,** borne singly or in pairs, is roughly oblong, 1-2½ inches long, and covered in a thick 4-part husk that splits to the base of the nut when ripe. The nutmeat is sweet with an excellent flavor. Shagbark hickory is named for the characteristic light-gray **bark** that separates into thick plates a foot or more long that curl outward at both ends. Older trees develop a rough, shaggy trunk. The **tree** grows on a variety of sites and soils, and may reach heights of 120 feet or more. It commonly grows 70-90 feet tall, and usually has a good form. Shagbark hickory is usually a minor component in the hardwood forests where it occurs. In the northern part of its range, it grows on upland slopes at elevations as high as 2,000 feet, where it is associated with oaks, other hickories, and various mixed hardwoods. In the South it is associated with a large number of hardwoods, especially those common to the bottomlands, and here prefers the deep, moist soils of alluvial origin.

PIGNUT HICKORY *(Carya glabra)* **leaves** are 8-12 inches long with 5 (rarely 7) finely-toothed, sharp-pointed, lanceolate leaflets. The **fruit** is globular to pear-shaped, about 1½ inches long, and enclosed in a thin husk that remains closed or opens only part-way down the nut. The nutmeat is small and sweet. The **tree** is 50-75 feet in height, with trunk diameters of 3-4 feet. The spreading, often drooping branches form a tall, narrow head. This hickory inhabits dry ridges and hillsides with well-drained soils, but responds well to richer soils. It is also common on moist sites in the southern portion of the Appalachian region. The best development of this species occurs in the lower basin of the Ohio River. It is the hickory most commonly found in the Appalachian forest, but even there is a minor component of the total forest resource. As the tree matures, the dark gray **bark** becomes deeply fissured and separates into scaly ridges that form into rough diamond patterns.



SHAGBARK HICKORY



PIGNUT HICKORY

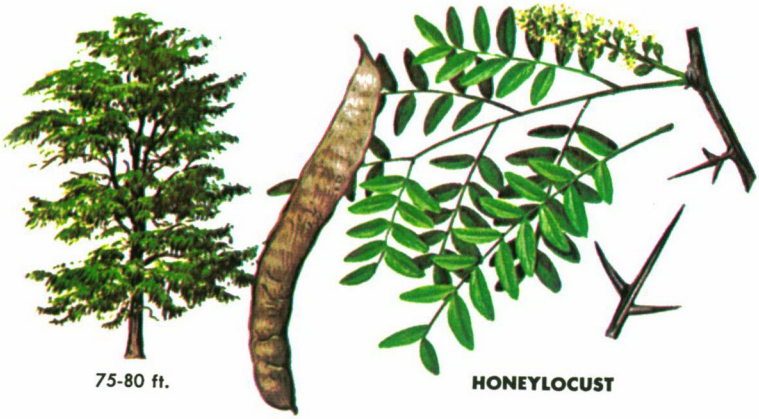
HONEYLOCUST *(Gleditsia triacanthos)* **leaves** are 7-8 inches long, pinnately compound and often bipinnately compound. Leaflets are oval, shiny dark green above and dull yellow-green below, 1-1½ inches long. Bipinnate leaves have 4-7 pairs of pinnae, each with as many as 28 leaflets. Branches and trunk are armed with stout, rigid, 3-forked spines 2-3 inches long. The **fruit** is a flat, dark-brown pod 12-18 inches long containing oval seeds. Pods twist into corkscrew shapes before falling in autumn or early winter. **Trees** typically attain heights of 75-80 feet with trunk diameters of 2-3 feet. Honeylocust prefers moist bottomlands but survives on all but the very driest sites. Crown is broad and flat-topped. **Bark** is dark brown or gray, divided into narrow flat plates.

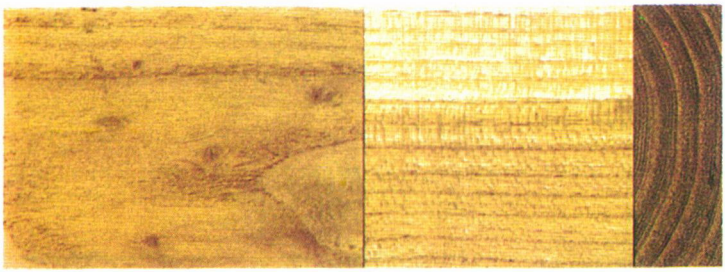
THE WOOD OF HONEYLOCUST

Properties — Honeylocust wood is very hard, very heavy, strong, stiff, and high in shock resistance. It is hard to work with tools, and does not glue satisfactorily. It has good nail-holding ability, but has a tendency to split. It is quite resistant to decay. Honeylocust wood is without characteristic odor or taste.

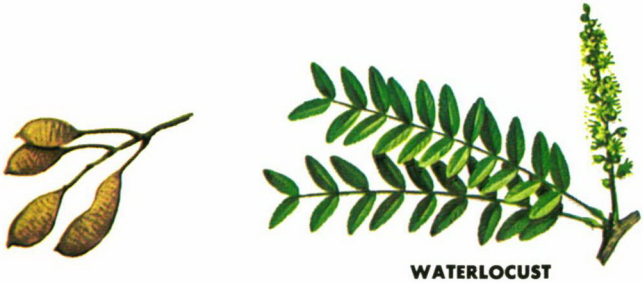
Uses — It is used for general construction, interior trim, and furniture. The wood has many desirable qualities, but is not marketed in large volumes because of its relative scarcity.

WATERLOCUST *(Gleditsia aquatica)* **leaves** are 5-8 inches long and may be either pinnate, or bipinnate with 3-4 pairs of pinnae. The oval leaflets are about 1 inch long, shiny yellow-green on the upper surface, dark green on the lower surface, and smooth margined. The flattened, roughly oval pods of the **fruit** are bright chestnut-brown, thin-walled, 1-2 inches long, and sharply pointed. Each pod contains 1 or occasionally 2 or 3 flat orange-brown seeds about ½-inch in diameter. Branches are armed with stout spines 3-5 inches long. Waterlocust prefers deep swamps and rich bottomlands, but is not common on any site. The **tree** grows 50-60 feet in height, with a short trunk 2-3 feet in diameter. The **wood** is coarse-grained, very heavy, hard, and strong. It is used for fenceposts, ties, and some lumber.





HONEYLOCUST
(approximately half-size)



BLACK LOCUST *(Robinia pseudoacacia)* **leaves** are 8-14 inches long, each one being made up of 7-19 oval leaflets alternate on both sides of the long, slender stem. Margins of leaflets are smooth. The whitish **flowers** are very fragrant, and hang in clusters on long stems. **Fruit** is in the form of brown flat pods, each bearing 4-8 kidney-shaped, dark-orange-brown seeds. Pods are mostly persistent on the tree through the winter. The **tree** grows on a variety of soils, and is a successful species in some areas for use in reclaiming of acid spoil banks from mining operations. It may attain heights of 70-80 feet and diameters of 3-4 feet. Black locust has heavy branches that often fork fairly close to the ground. Twigs bear spines ½-1 inch long. The thick **bark** is deeply furrowed, dark reddish-brown, and scaly. Bark of sprouts, and seedlings, are important food for cottontail rabbits in winter, especially when snow accumulates. Seeds are used by many kinds of birds.

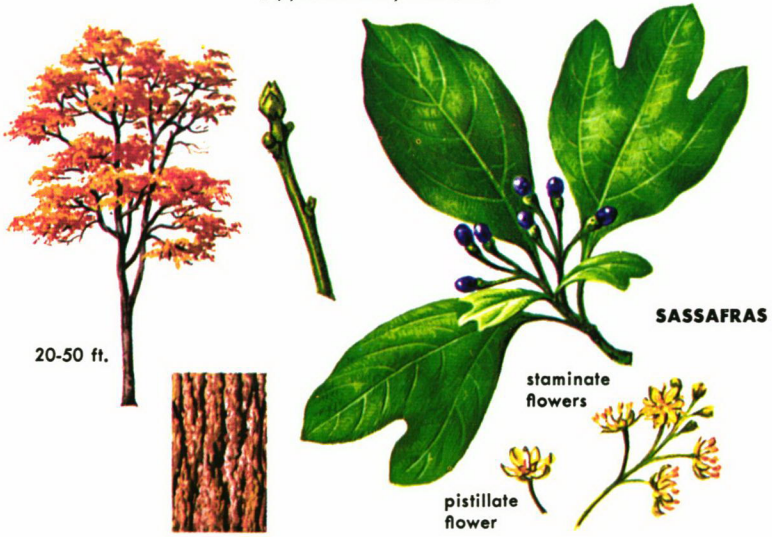
THE WOOD OF BLACK LOCUST

Properties — Black locust is very heavy, very hard, and exceedingly strong and stiff. It has very high shock resistance, high nail-holding qualities, and good durability and decay resistance. It is moderately low in shrinkage and turns well although it is generally difficult to work with hand tools.

Uses — Locust is used for fence posts, poles, ties, mine timbers, and stakes. It is also used for boxes, crates, woodenware, and novelties. Sound, straight pieces are prized for use in pole-type barns.

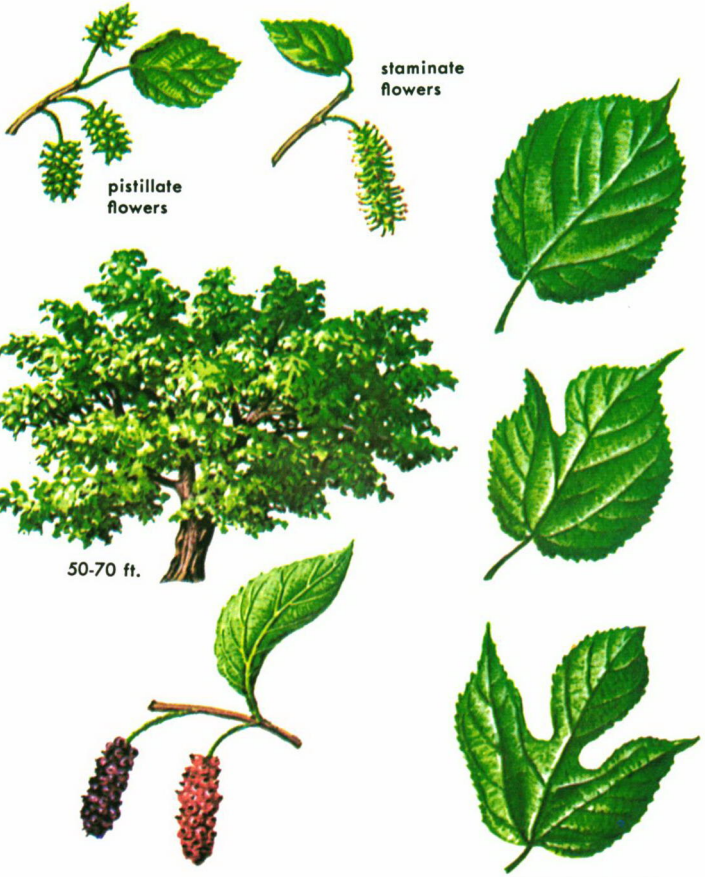
SASSAFRAS *(Sassafras albidum)* **leaves** are deciduous, 4-6 inches long, and may be entire (not lobed), or 2-lobed, or 3-lobed on the same tree or branch. In autumn, leaves turn yellow and crimson. The **fruit** ripens in September and October, with a dark blue berry-like, thin, fleshy covering over the hard seed. Each fruit is borne on a stalk 1½-2 inches long. Roots, twigs, and bark of sassafras are aromatic, yielding oil of sassafras (a flavoring) and sassafras tea which is highly regarded as a spring tonic. The **tree** may reach 50 feet or more in height but usually is shorter. It is a tenacious tree that can survive fire, and sprouts readily. The aromatic **wood** is soft, weak, and brittle. It finds limited use for fence posts, slack cooperage, crating, and small, open fishing boats. The fruit is eaten in early fall by deer, turkey, bear, and many species of birds.

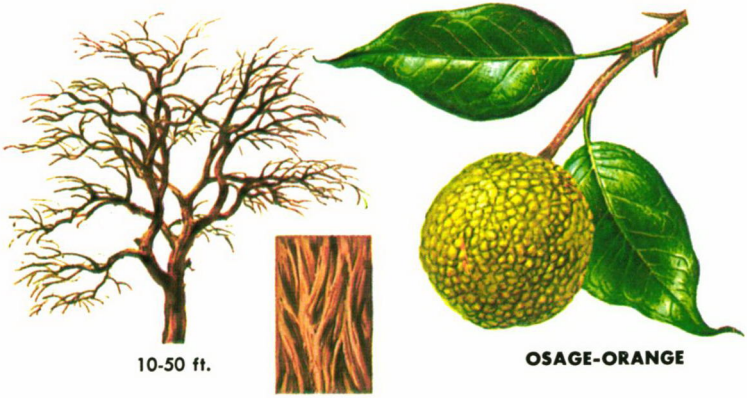
BLACK LOCUST
(approximately half-size)



RED MULBERRY *(Morus rubra)* **leaves** are broadly oval, sharp-pointed, 3-5 inches long, and have toothed margins. Leaves are often 2-lobed or 3-lobed, especially on young shoots. Undersides of leaves have short white hairs which are thickest along the orange midrib. The **fruit** resembles that of blackberry. Fruits are red when immature, turning deep purple when ripe. Berries are 1-1½ inches long, sweet, juicy, and edible. The **tree** may reach 50-70 feet in height with trunk diameters rarely larger than 3-4 feet. It usually has a short trunk, and a dense and spreading crown. The **bark** is dark brown with a reddish tinge, scaly, with the tips of the scales curling and peeling off. The **wood** is light, soft, not strong, but quite durable. It is used for rough fencing and slack cooperage. This is a small, rather scarce tree, and therefore not considered as a species of prime commercial importance. The berry ripens in late May and June, and is a favorite food of gray squirrels, wild turkeys, and many songbirds.

OSAGE-ORANGE *(Maclura pomifera)* has pointed-oval **leaves** 3-5 inches long, smooth margined, rounded at the base, and with veins that curve inward near the margins. The greenish-yellow **fruit** is conspicuous as it ripens in the fall. It is 4-5 inches in diameter, rough-surfaced, and exudes thick milky juice when bruised. Twigs are usually thorny. Individual **trees** on a good site may sometimes reach 50-60 feet in height and 3 feet in diameter. The thick **bark** is deeply furrowed and dark orange-colored, breaking into broad, rounded ridges as the tree gets older. The **wood** is exceptionally strong, heavy, hard, and flexible. It was used by Indian tribes for bows, hence another common name for the species, "bow wood." Currently it is used for fenceposts, ties, and woodenware. Osage-orange is often planted for hedges in the Southern Plain states and in the Midwest.


staminate flowers
pistillate flowers
50-70 ft.
RED MULBERRY


10-50 ft.
OSAGE-ORANGE

SWEETGUM *(Liquidambar styraciflua)* has easily recognized star-shaped **leaves** made up of 5 (occasionly 7) deeply separated, pointed lobes. Leaves have long petioles (stems), are palmately veined, have toothed margins, and are 5-7 inches long and broad. They turn deep red in autumn. The round, bur-like, hard, woody **fruit** is 1-1½ inches in diameter, borne on a long stalk, and persistent through the winter. Sweetgum twigs often have corky wings. The **tree** grows best on rich bottomlands, reaching heights there of 120 feet and diameters of 4 feet or more. This is an intolerant species, and will not do well in the understory or where there is severe competition.

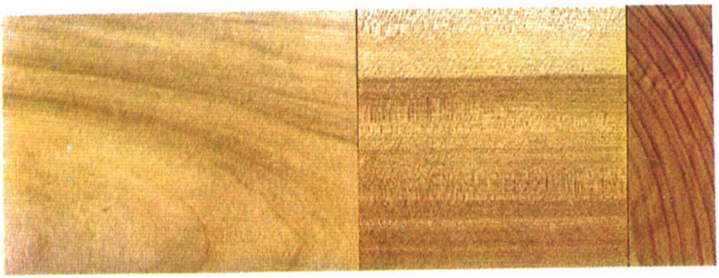
THE WOOD OF SWEETGUM

Properties — Sweetgum wood is classified as moderate in heaviness, strength, and stiffness, but moderately high in shock resistance. Heartwood is low in decay resistance, and intermediate in nail-holding ability and splitting. It requires special drying before successful gluing can be accomplished. Sweetgum ranks above average in turning, boring, and steam-bending, but below average in other machining properties.

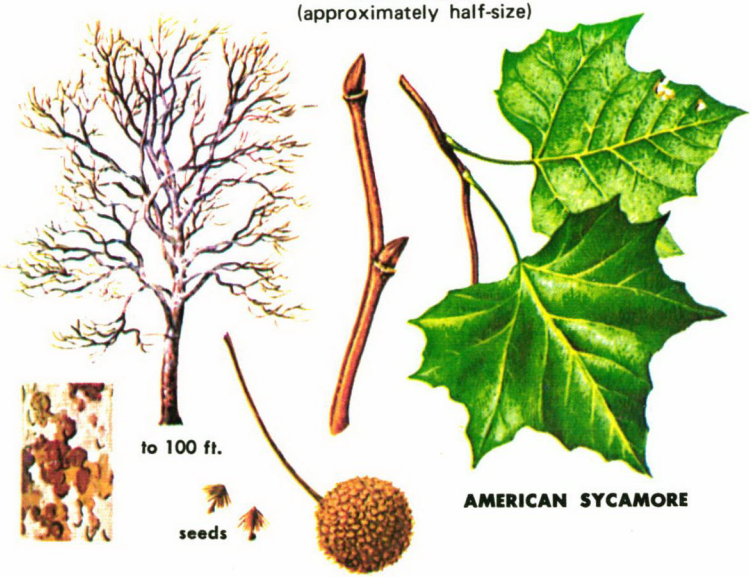
Uses — The wood from sweetgum is used for lumber, veneer, plywood, and slack cooperage. The lumber is remanufactured into boxes, baskets, crates, interior parts of furniture, and interior woodwork. Minor uses include crossties, fuel, fencing, excelsior, and pulpwood.

AMERICAN SYCAMORE *(Platanus occidentalis)* is an easily recognized tree because of its multicolored, mottled **bark.** The whitish bark that covers trunk and branches of the upper part of the tree falls off in irregular patches, exposing the underneath bark. The resulting patchy patterns of brown, green, and gray are characteristic and quite conspicuous. Sycamore has a wide geographical range, and grows well on a variety of sites. On preferred sites where there is a good supply of water the **tree** is fast-growing, attaining heights of 100 feet or more (occasionally 150 feet) and trunk diameters of 10 feet or more. The **leaves** are usually 3-4 lobed, being divided by broad, shallow sinuses. Leaves are 4-7 inches long and broad, with palmate veining and toothed edges. Twigs grow in a zigzag pattern and are encircled by a toothed stipule at the base of each leaf, where the large, pointed lateral bud is borne. The **fruit** is a spherical aggregate about 1 inch in diameter that breaks up when ripe to disperse the small, elongated seeds.

SWEETGUM



SWEETGUM
(approximately half-size)



AMERICAN SYCAMORE

THE WOOD OF SYCAMORE

Properties — Sycamore is close-textured and has an interlocking grain. It is classed as moderate in heaviness, hardness, strength, stiffness, and shock resistance. It is difficult to season, and is not durable under conditions favorable to decay. It turns well on a lathe, and bends well when steamed. Nail-holding ability is only intermediate, but it withstands splitting very well.

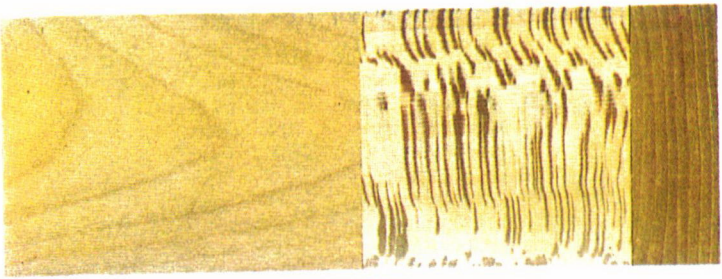
Uses — Sycamore is used for lumber, veneer, ties, slack cooperage, fencing and interior parts of furniture. It is also used for flooring, handles, and butchers' blocks. It is used by the food industry for containers since it imparts no taste or color to the contents.

YELLOW-POPLAR *(Liriodendron tulipifera)* is one of the most attractive species of eastern forests, becoming especially stately in some of the rich coves of the Appalachians and in the Lower Ohio River Basin. The **tree** sometimes reaches heights approaching 200 feet, with a straight, clear trunk 8-10 feet in diameter that may be free of branches 80-100 feet from the ground. The crown has a compact pyramidal shape, often tapering sharply to a pointed top, that stands out in early autumn foliage displays with its clear yellow color. **Bark** of yellow-poplar is light-gray to brown, becoming thick and deeply furrowed on older trees. **Flowers** are tulip-like, 1½-2 inches across, with yellowish-green petals that are conspicuously marked with reddish-orange bands near the base. The **fruit** is a cone-like aggregate 2½-3 inches long that breaks up as it matures in September and October. **Leaves** of yellow-poplar are distinctive and easily recognized, being composed of four large lobes. The leaves are 5-6 inches long, about as broad as long, with the two outer lobes often flattened into a squarish end. Sprouts are a staple deer browse. Seeds are used by squirrels in early fall and again in mid-winter.

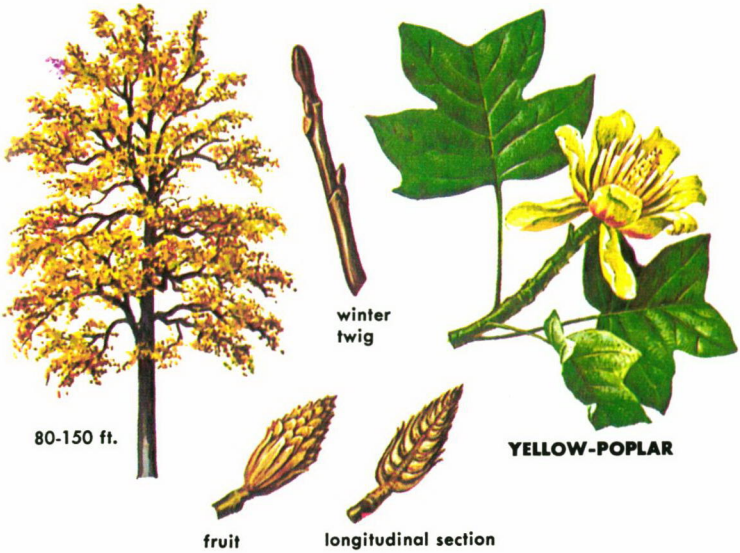
THE WOOD OF YELLOW-POPLAR

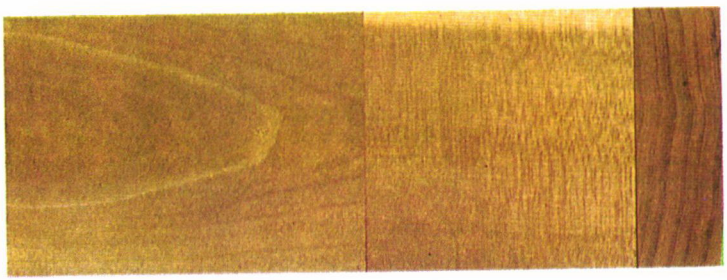
Properties — Yellow-poplar is classed as moderately light in weight, moderately stiff, but moderately low in shock resistance and in bending and compressive strength. It has moderately large shrinkage when dried, but is not difficult to season and stays in place well after it is seasoned. The wood is intermediate in machining properties, but low in nail-withdrawal resistance. It has little tendency to split when nailed. It takes and holds paint, enamel, and stain very well.

Uses — Yellow-poplar is used for lumber, veneer, and pulpwood. The lumber is made into interior parts of furniture, boxes, crates, interior finish, siding, veneer core-stock, musical instruments, and fixtures. The veneer is used extensively for furniture, finish, and various forms of cabinetwork. It has so many desirable characteristics that it is suitable for a wide variety of important uses.



SYCAMORE
(approximately half-size)

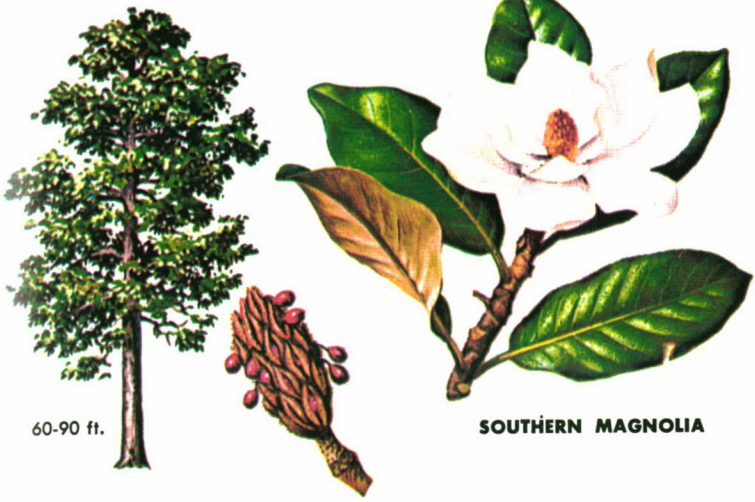




YELLOW-POPLAR
(approximately half-size)

SOUTHERN MAGNOLIA *(Magnolia grandiflora)* is an evergreen tree often planted as an ornamental in southern coastal states. Its **leaves** are shiny bright green on the upper surfaces, leathery, and covered on the lower surfaces with rusty-colored fuzz. Leaves are oblong, bluntly pointed, 5-8 inches long, and 2-3 inches wide. The beautiful white, fragrant **flowers** are 7-8 inches across. The **fruit** is an aggregate made up of numerous pod-like structures that each contains 2-3 crimson seeds. The fruit is reddish as it forms, turning brown and fuzzy as it matures. Seeds hang from the pods on slender stalks when ripe. The **tree** is often pyramidal with a tall straight trunk, sometimes attaining heights of 100 feet or more and diameters of 3-4 feet on good sites. The **bark** varies from gray to brown, and becomes quite scaly on older trees. The **twigs** are stout and have conspicuous rings at the nodes. As in all of the magnolias, a single scale covers each bud. The **wood** is hard and heavy, being utilized for crates, boxes, and some rough flooring. The **fruit** is used by squirrels and wild turkeys through the fall months.

SWEETBAY *(Magnolia virginiana)* is a swamp magnolia, preferring the borders of ponds and streams, rich hummocks in swamps, and the wetlands themselves. Sweetbay **leaves** are oblong, 4-6 inches long, deciduous, with smooth margins. Leaves are blunt-pointed, shiny bright green on the upper surfaces, pale or whitish on the lower surfaces, and have conspicuous midribs and veins. The creamy white **flowers** are 2-3 inches across, and fragrant. The oblong aggregate **fruit** is dark red and about 2 inches long. The **tree** may reach 60 feet in height on the best sites, but usually is a slender tree 20-30 feet high. Sweetbay leaves are persistent on the tree throughout the winter in the South, falling when the new leaves appear in spring. In northern parts of its range, sweetbay is deciduous. The **wood** is soft, being used commercially for some minor products such as handles and novelty woodenware, and for core stock for lower-grade furniture.


60-90 ft.
fruit
SOUTHERN MAGNOLIA

in southern swamps,
to 60 ft.
in northern areas,
may be a shrub
SWEETBAY

CUCUMBERTREE *(Magnolia acuminata)* **leaves** have an oblong-oval shape, smooth often wavy margins, and abruptly sharp-pointed ends. They are deciduous, 6-10 inches long, 4-8 inches wide, shiny yellowish-green on the upper surfaces and paler below. The **fruit** is an aggregate, 2-3 inches long, bright red when immature turning brownish as it matures. Each section of the fruit contains 1-2 ovoid-shaped crimson seeds that hang from the pod on slender stems when ripe. **Flowers** are bell-shaped 2½-3 inches long, and green to greenish-yellow in color. Cucumbertree often has a pyramidal crown, small branches, and a straight trunk. The **tree** grows to heights of 70-80 feet and diameters of 3-4 feet. The **bark** is dark brown, furrowed, and quite scaly. The **wood** is light and soft, not strong but durable. It is used in furniture and cabinetmaking, and sometimes for flooring.

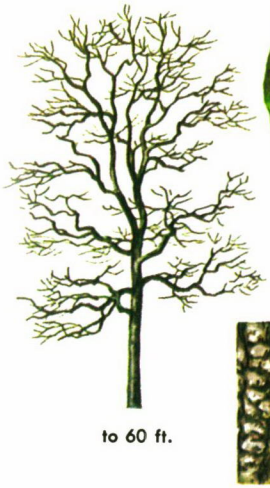
COMMON PERSIMMON *(Diospyros virginiana)* has broadly oblong, pointed **leaves,** 4-6 inches long and 2-3 inches wide. The leaf has a smooth margin and a broad, flat midrib. Male and female **flowers** occur on separate trees. Male flowers are in 2-3 flowered clusters, while the female flower is solitary. The **fruit,** edible when ripe, is 1-2 inches in diameter, a rich reddish-purple color, and contains several flattened oblong seeds about ½-inch long. The fruit is eaten by possums, raccoons, deer, fox, hogs, and many bird species. The characteristic **bark** pattern of persimmon is easily recognized, being dark colored and deeply divided into thick, square plates. The **tree** grows best on rich, moist sites where it may attain heights of 60 feet (rarely more) and diameters of about 18 inches. On poorer sites this species is commonly 15-20 feet high, of poor shrubby form, and considered as a forest weed species since it never attains commercial size. The dark brown-to-black **wood** is very hard and shock-resistant, finding uses as spindles, shuttles, golf-club heads, and some furniture.

THE WOOD OF PERSIMMON

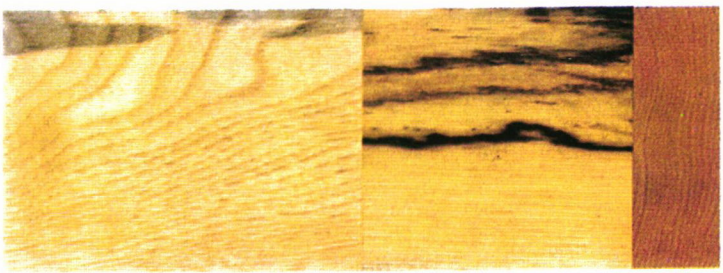
Properties – Persimmon wood is very heavy, very hard, very strong, and resistant to bending. It is difficult to work with tools, does not glue well, and has considerable shrinkage when drying. Persimmon is high in shock resistance and in nail-holding properties. It smooths well, and stays in place well after seasoning. It is not highly resistant to decay.

Uses – Because of its exceptional hardness and toughness, persimmon wood is valued for use in bobbins, shuttles, golf-club heads, and spools. It is also used for boxes and crates, and to a limited extent for handles.

CUCUMBERTREE



COMMON PERSIMMON



PERSIMMON
(approximately half-size)

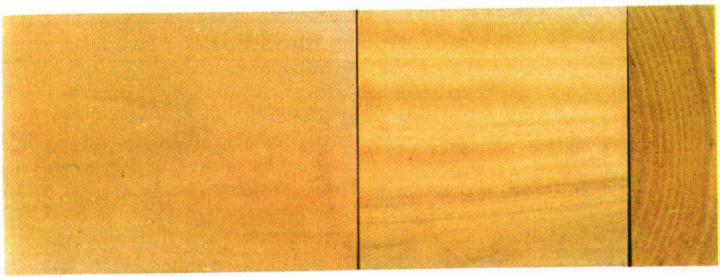
BLACK TUPELO *(Nyssa sylvatica)* **leaves** are alternate, roughly oval with short, blunt points, smooth-margined, 2-5 inches long and ½-3 inches wide. Early in the autumn the leaves turn bright scarlet, often making the first showy display of fall colors in southeastern forests. The **fruit** is round, dark blue, about ½-inch in diameter, and clustered on stalks up to 1½ inches long. Thin, acrid flesh surrounds the small, ribbed seed. The **tree** occasionally reaches 100 feet in height and 4-5 feet in trunk diameter. The crown often is flat and spreading where the stand is fairly open, and narrow and conical in dense stands.

THE WOOD OF BLACK TUPELO

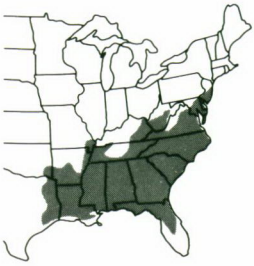
Properties — The wood of black tupelo is hard, moderately heavy, and low to moderate in decay resistance. It is classed as moderately weak when used in beams or posts. It is moderately limber and moderately high in ability to resist shock. The wood is difficult to dry because it has large shrinkage during seasoning, and a tendency to warp because of its interlocking grain. It requires special seasoning and drying before it can be successfully glued. It is below average in machining properties, but intermediate in nail-holding and resistance to splitting.

Uses — Black tupelo is used for lumber, veneer, and pulpwood, and to some extent for railway ties and slack cooperage. The lumber goes mostly into shipping containers and parts of furniture. The wood can be readily pulped, and is used for high-grade book and magazine papers.

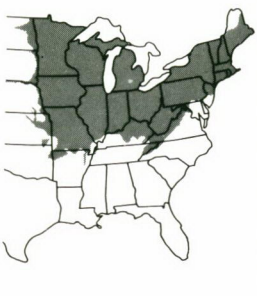
WATER TUPELO *(Nyssa aquatica)* is most common on low, wet sites such as those in and near swamps. It is seldom found higher than 5 feet above the level of nearby streams, often growing where water stands deep around its base during flood season. The lower trunk of water tupelo is often swollen, deeply lobed, and buttressed as is the trunk of baldcypress (a companion swamp species). **Leaves** of water tupelo are pointed-oblong, long-pointed at the apex, 5-7 inches long and 2-4 inches wide. Leaves are usually shallowly toothed, each tooth coming to a small, abrupt tip. The **fruit** is borne on slender drooping stalks 3-4 inches long. It is about one inch long, oblong, dark purple in color, and with a tough skin and thin layer of flesh over the seed. The **tree** may reach 110 feet in height and 3-4 feet in diameter on the best sites. In a forest stand, water tupelo develops a long clean trunk above its buttressed base. The crown usually is a narrow oblong, or pyramidal. The **wood** is light, soft, and close-grained, but not strong. It is used in furniture, veneer, pulpwood, railway ties, and slack cooperage.



BLACK TUPELO
(approximately half-size)



AMERICAN HOLLY *(Ilex opaca)* has the spiny, wavy-edged, glossy **leaves** that (along with the bright red berries) make it highly valued for Christmas decoration. The leaves are evergreen through the winter, each leaf persisting for three years. They are 2-4 inches long, with prominent midribs and veins. The **fruit** ripens in the late autumn and remains on the tree over the winter. It is globose (spherical), and each bright-red, fleshy berry is borne on a short stalk. The **tree** usually reaches 40-50 feet in height but occasionally reaches 100 feet. It is not a common forest species anywhere. Mature trees tend to form a pyramid shape with a narrow crown. The **wood** is light and tough but not strong. It is close-grained, and valued for various kinds of interior-finishing uses, and for inlays for joiner-cabinet work. The berries are used for food by songbirds, deer, and wild turkeys. Flocks of turkeys have been observed feeding on holly in winter, with some of the birds feeding in the tree crowns as well as on the ground.



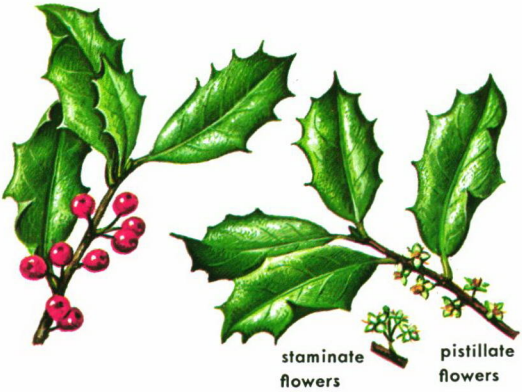
AMERICAN BASSWOOD *(Tilia americana)* has large, alternate, roughly toothed **leaves** that are sharply pointed. Leaves are heart-shaped, conspicuously veined, 5-6 inches long and 3-4 inches wide. The **fruits** are hard and rounded, hanging suspended in clusters from a stalk that is attached to a papery-thin, strap-shaped bract. Each fruit contains two seeds and is covered with a thick, reddish-brown fuzz. American basswood is a tall and stately **tree**, sometimes reaching 120-140 feet in height and 4-4½ feet in diameter. The small slightly drooping branches form a broad, round-topped crown in open stands or a narrow pyramidal crown in dense stands. In closed forest stands the tree often has a straight bole that is clear of branches for half the tree's total height. Forest-grown basswood trees are easily damaged by fire; thus most large, older trees will be hollow or otherwise defective.

THE WOOD OF BASSWOOD

Properties — Basswood is light, weak, low in resistance to shock, and soft, but moderately stiff. It has large shrinkage, but stays in place well after seasoning. It has low nail-holding ability, but resists splitting. The wood of basswood is easy to work, holds paint well, and glues easily. It is prized by wood-carvers because it is easily worked and has an even grain.

Uses — Most basswood is cut into lumber for remanufacture into crates and boxes. Higher grades are used for sash, doors, and general millwork. Considerable amount goes into furniture, especially as core stock to be overlaid with high-grade veneers. Basswood is also used for pulpwood.

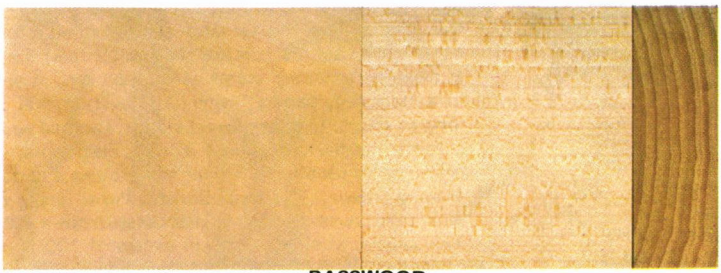
to 50 ft.



AMERICAN HOLLY

70-100 ft.

AMERICAN BASSWOOD



BASSWOOD
(approximately half-size)

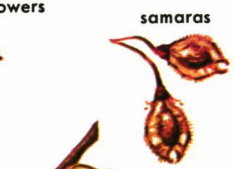
WHITE BASSWOOD *(Tilia heterophylla)* **leaves** are broadly heart-shaped, alternate, 3½-5½ inches long and 2½-3 inches wide. The leaves are sharply pointed, have finely toothed margins, and are covered on the underside with thick fuzz that is white on leaves of lower branches and brownish on those of upper branches. **Fruits** are irregularly spherical, nut-like, and hang clustered beneath a papery-thin, strap-shaped bract. Fruits are covered with a rusty-brown fuzz. The tree attains a height of 90 feet and diameters of 3 feet or more. It is most common in the Appalachian Mountains between 3,000 and 5,000 feet elevation, where it prefers cove sites with well-drained soils. The **wood** is very similar to that of American basswood, and is used in the same products.

CAROLINA BASSWOOD *(Tilia caroliniana)* is quite similar to white basswood except that the fuzz which covers the undersides of **leaves** is brownish instead of white as on the white basswood leaves.

AMERICAN ELM *(Ulmus americana)* is a treasured ornamental and shade tree, lending its graceful, spreading form to many streets, parks, and campuses in eastern United States. Tragically, many of these stately trees have been wiped out by the Dutch elm disease in recent years. The **leaves** of American elm are oval, coming to a long slightly curved point. Leaves are rough-textured, rounded at the base on one side of the midrib, but shorter and almost straight on the other side. Leaf margins are sharply-toothed. The **fruit** is clustered on long stems. The small seed is encased in a flattened, papery, wing-like covering that is oblong in shape. In dense forest stands, the **tree** will have a fairly narrow crown and a long, clear bole. Open-grown trees usually fork near the ground and develop arching crowns. The characteristic "urn" shape of the elms permits easy identification even from a distance. This species attains heights in excess of 100 feet, and diameters of 6-11 feet. Old trees are sometimes enlarged at the base by large buttresses.

WHITE BASSWOOD

ELMS *Ulmus* **HACKBERRIES** *Celtis*



AMERICAN ELM

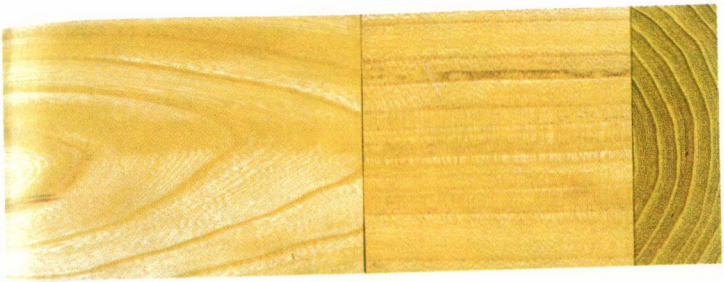
THE WOOD OF AMERICAN ELM

Properties – American elm is classed as moderate in heaviness, hardness, and stiffness. It has good shock resistance, but is moderately weak. Like all other commercial species of elm, it has excellent bending qualities. The wood is slightly below average in woodworking properties, but is among the best in ease of gluing. It is intermediate in nail-holding ability.

Uses – American elm lumber is used in the manufacture of containers, furniture, and dairy and poultry supplies. Because it bends so readily, it is much used for slack cooperage and kegs. Its veneer goes into fruit and vegetable boxes, crates, and baskets. It is used for crating of heavy articles, and in furniture for the bent parts of chairs and other items.

SLIPPERY ELM *(Ulmus rubra)* **Leaves** resemble those of American elm, being rough-textured, roughly-oval, pointed with curving tips, unsymmetrical at the base, and sharply-toothed. The leaves are somewhat larger than those of American elm, being usually 5-7 inches long. The **fruit** is also wafer-like, the seed being enclosed in a flat leathery covering. The fruit is about ¾-inch in diameter and has a seed cavity covered with thick rusty-brown fuzz. The **tree** attains heights of 60-70 feet on average sites, and diameters of 2-3 feet. The form is similar to the "urn" shape of American elm. The **wood** of slippery elm is considered the best of the elms. It is tough, coarse-grained, heavy, strong, and stains attractively. Its uses are mainly in furniture, crating, boxes, rough flooring, farm buildings, and gates. The common name of this species comes from the mucilaginous coating of the fragrant inner bark that is slippery to the touch.

WINGED ELM *(Ulmus alata)* takes its common name from the corky "wings" on the twigs which are often ½-inch wide. **Leaves** are oblong-oval, pointed, rough-textured, and coarsely toothed on the margins. The **fruit** is about 1/3-inch long, each one tipped at the end with two long, incurving bristles (awns). The fruits (samaras) are covered with light-colored, hairy fuzz. The **tree** commonly grows to 40-50 feet in height, but may reach 80-100 feet on better sites. Open-grown, it has a short bole, with branches arching upward to form an open, rounded crown. Forest-grown trees are often tall and straight. The heavy **wood** is hard and strong, finding uses in the furniture industry, and in crates and boxes.

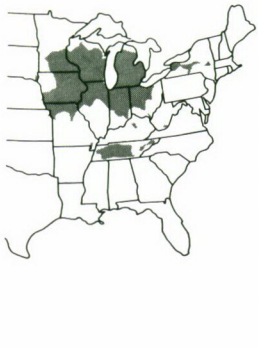


AMERICAN ELM
(approximately half-size)

samaras

SLIPPERY ELM

WINGED ELM



ROCK ELM *(Ulmus thomasii)* has a rather narrow, round-topped crown in contrast to the umbrella shape of the American and slippery elms. **Leaves** of the rock elm are similar to the other elms, but smaller. They are broadly-oval, pointed, rough-textured, deeply veined, 2-3 inches long, and have roughly-toothed margins. The oval, flattened **fruits** (samaras) are about ¾-inch long with a shallow notch at the end and an inconspicuous seed cavity. The **tree** grows to 60-80 feet in height on average sites, with diameters of 1½-2 feet. It often has a single stem instead of forking as other elms usually do. It often occurs on rocky ridges but grows best on moist, well-drained sandy loams.

THE WOOD OF ROCK ELM

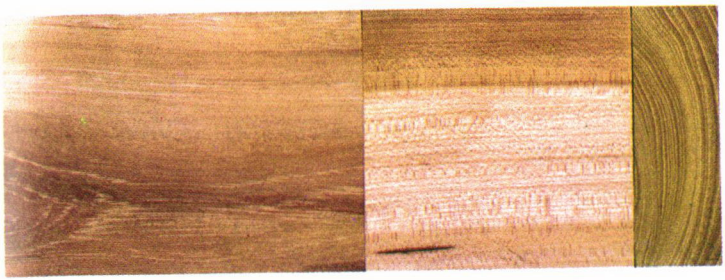
Properties — The wood of rock elm is heavy and hard. It is stronger, harder, and stiffer than any of the other commercial species of elms. Rock elm also has higher shock resistance than any other American hardwood except hickory or dogwood. The wood of rock elm is difficult to work with hand or machine tools, but it has excellent bending qualities. The heartwood has only moderate resistance to decay.

Uses — Elm lumber is used principally for containers and furniture. The wood is used for veneer that is made into fruit and vegetable boxes and baskets. Large quantities go into crating for heavy articles such as furniture and appliances. The strength and toughness of this wood make it good for containers that must stand rough usage such as market baskets and bushel baskets. Considerable quantities are used in the manufacture of furniture, especially the bent parts of chairs, tables, etc.

CEDAR ELM *(Ulmus crassifolia)* **leaves** are 1-2 inches long, ½-1 inch wide, roughly serrate (toothed) on the margins with teeth that are somewhat rounded at the tips rather than sharp. The leaves are oval, and unsymmetrical at the base (which is typical of all elms). The oblong **fruits** ripen in September. They are short-stalked, deeply notched at the end, and covered with soft white hair that is thickest along the margin of the broad wing of the fruit (samara). The **tree** often grows to 80 feet in height with a tall straight trunk up to 3 feet in diameter. The stout branches divide to form a broad round-topped head with rather droopy branches. The heavy, strong, hard **wood** is useful wherever these properties are of value, such as in the manufacture of furniture framing.

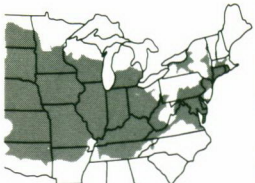
60-80 ft.

ROCK ELM



ROCK ELM
(approximately half-size)

CEDAR ELM



HACKBERRY *(Celtis occidentalis)* **leaves** are unsymmetrically oval, 2½-3½ inches long with sharply-toothed margins, and have curving, pointed tips. The globular **fruit** is borne singly on stems ½-¾-inch long, ripening in September but often remaining on the tree over the winter. The fruit is dark purple and about 1/3-inch in diameter. Hackberry is widely distributed in eastern United States and adapts to a variety of sites and climates. It is principally a bottomland tree, growing best on valley soils. In much of its range it is common on slopes and bluffs. The **tree** commonly grows to 30-40 feet in height, but on the best sites may reach a height of 130 feet and a diameter of 4 feet or more. The **bark** is smooth, dark brown to gray, and quite thickly covered with warty protuberances.

THE WOOD OF HACKBERRY

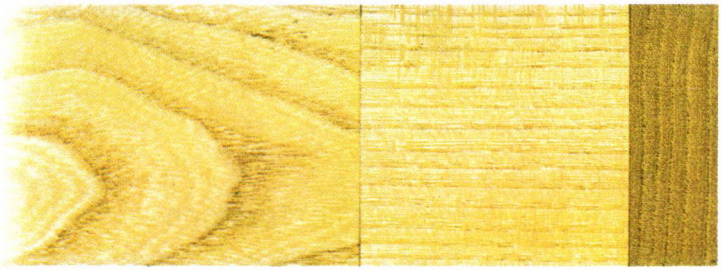
Properties — The woods of hackberry and sugarberry are quite similar, and share many of the same properties. The wood is moderately heavy, moderately hard, high in shock resistance, and with average resistance to decay. The grain is straight, but sometimes is interlocked. The wood is average in nail-holding ability, and works well with tools except that it shapes poorly. Shrinkage during drying is moderate. The wood holds its shape well after seasoning, and glues very well. It has no characteristic taste or odor.

Uses — Good grades of hackberry are used for furniture. Hackberry is also used for millwork and some athletic equipment. Poorer grades find their usage in crates and boxes. Quite often hackberry and sugarberry are mixed in with ash and elm at the sawmill, and these woods are sold together and find common usage.

SUGARBERRY *(Celtis laevigata)* has long-oval, pointed, unsymmetrical **leaves** with smooth margins. The **fruit**, which ripens in September, is round, borne singly on a stalk, and orange-red to yellow when ripe. The **tree** attains a height of about 80 feet when mature, and a diameter of 18 inches (rarely up to 3 feet). The pale-gray **bark** is covered with prominent warty protrusions. The **wood** is not strong, and quite coarse-grained. It is used mostly for unexposed parts of furniture.

30-40 ft.

HACKBERRY



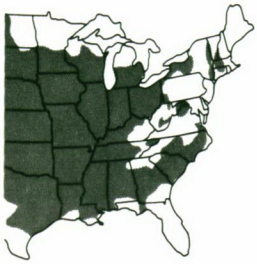
HACKBERRY
(approximately half-size)

SUGARBERRY

GEORGIA HACKBERRY

LINDHEIMER HACKBERRY

NETLEAF HACKBERRY

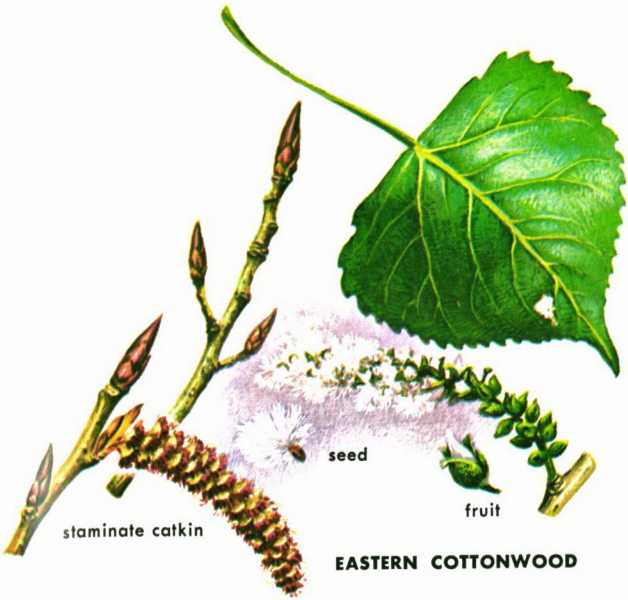


EASTERN COTTONWOOD *(Populus deltoides)* is the fastest-growing commercial forest species in North America. It is also one of the tallest **trees** of eastern forests, attaining heights close to 200 feet and diameters of 4-6 feet. Carefully selected stock planted on favorable sites in the Mississippi Delta have attained 5-inch diameters and 30-foot heights in two growing seasons. The **leaves** are roughly triangular, toothed, pointed, 3-6 inches long, paler below than above, and with a flattened stem. The **fruit** consists of numerous green bud-shaped capsules that are clustered along short stems that hang from the branches in long, narrow clusters. Seeds are released from the capsules when ripe and drift on the breeze, each one suspended from a tuft of white "cottony" hairs. **Bark** on young trees and on upper stems of older trees is smooth and greenish. Bark of older trees is dark gray, heavily furrowed and ridged. Cottonwood does best on moist, well-drained soils such as those found in many areas of the Mississippi Valley. It does not often develop into a well-shaped tree if it is more than 15-50 feet above the average level of the streams in the area.

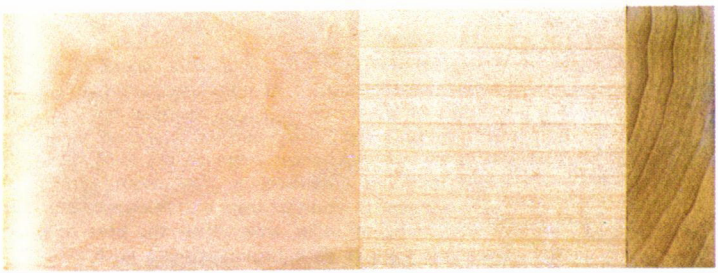
THE WOOD OF COTTONWOOD

Properties — The woods of the several cottonwood species are similar, and are sold together for the same uses. Cottonwood is moderately light in weight, moderately soft, and moderately limber. It is moderately weak in bending and compression and moderately low in shock resistance. Shrinkage during drying is classed as moderately large, and the wood requires careful seasoning if warp is to be avoided. Cottonwood is low in resistance to nail-withdrawal, but does not split easily. It is difficult to work with tools without producing chipped or fuzzy grain, primarily because of the pockets of tension wood common to the species. It holds paint well.

Uses — Much cottonwood is cut into lumber and veneer that is remanufactured into containers and interior parts of furniture. The chief use of both the lumber and veneer in furniture manufacturing is as core stock that is overlaid with high-grade veneers. Cottonwood is much used for pulpwood, and is one of the few hardwood species that is planted and grown specifically for that purpose. The pulp is used in high-grade magazine and book paper.



EASTERN COTTONWOOD



COTTONWOOD
(approximately half-size)

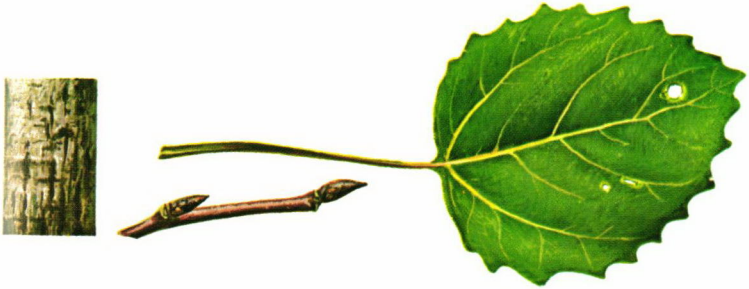
SWAMP COTTONWOOD *(Populus heterophylla)* is well named since it inhabits very wet bottomlands and sloughs; it is very abundant and of the largest size in the valleys of lower Ohio, southeastern Missouri, eastern Arkansas, and western Mississippi. **Leaves** of swamp cottonwood are broadly oval, 4-7 inches long, and 3-6 inches wide. They are rounded at the tips, and often heart-shaped at the base. Margins are toothed, but the teeth are quite shallow and rounded. Leaves have a stout yellow midrib. The **fruit** resembles that of eastern cottonwood. The **tree** may reach 100 feet in height and 3 feet in diameter on preferred sites, but usually is poorly formed. It grows in small patches or singly.

BALSAM POPLAR *(Populus balsamifera)* is one of the faster-growing trees of the northern forests, where it can attain heights of 100 feet or more, and diameters of 3-7 feet. **Leaves** are roughly oval, 5-7 inches long, 4-5 inches wide, pointed, and have conspicuous rounded teeth along the margins. Leaves are dark green on the upper surfaces and lighter green on the lower sides. The **fruit** is borne on stalks that hang from the branches in clusters. The buds are covered with a sticky, fragrant resinous material in the spring. The **wood** is used for veneer, furniture parts, and pulpwood.

BIGTOOTH ASPEN *(Populus grandidentata)* **leaves** give the species its common name, as the leaf margins have very conspicuous rounded teeth. Leaves are almost round, sharp-pointed, dark green on the upper surface but lighter green on the lower, and 2-3 inches long and wide. **Bark** is thin, smooth, and light-gray to green on younger trees and the upper portions of the stems of older trees. Near the base of older trees, the bark is dark brown tinged with red, and ¾ to 1 inch thick. This **tree** grows to 60-70 feet in height and about 2 feet in diameter, often with a narrow, round-topped crown. The soft, light-colored **wood** is used for interior parts of furniture, and for pulpwood.

SWAMP COTTONWOOD

BALSAM POPLAR



BIGTOOTH ASPEN

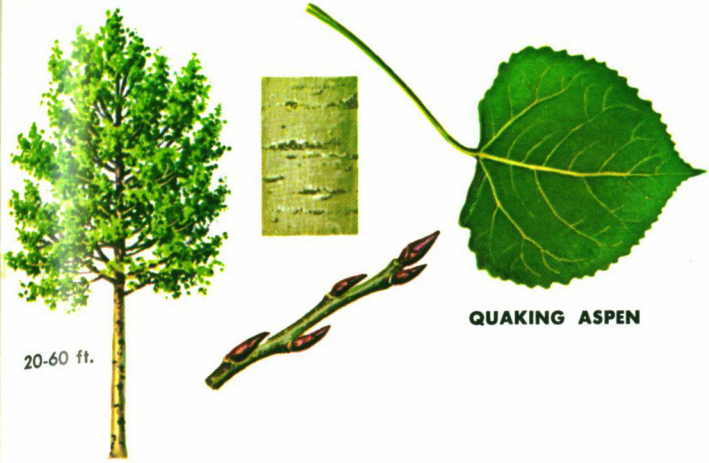
QUAKING ASPEN *(Populus tremuloides)* is the most widely distributed tree species in North America, although it is not a component of the southeastern forests below Virginia. The almost circular **leaves** give this species its name, each leaf trembling in the slightest breeze at the end of a long, flattened stem. Leaves are 1-4 inches in diameter, sharply pointed, roughly-toothed, and with a prominent, light-colored midrib. They are shiny green above, lighter-colored below. The **tree** may attain heights around 100 feet with a trunk diameter of about 3 feet, but usually is smaller (20-60 feet tall). The round-topped crown is usually narrow and symmetrical. The thin **bark** is light green and smooth except for warty bands or patches of dark-colored scaly protuberances.

THE WOOD OF QUAKING ASPEN

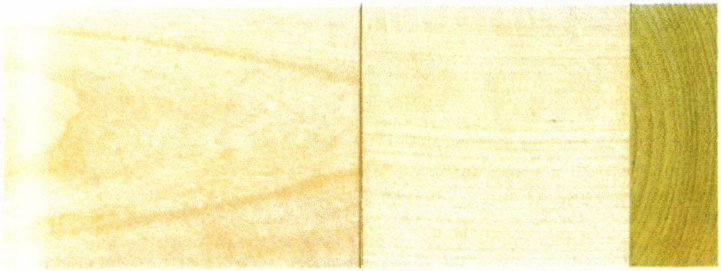
Properties — The wood of quaking aspen is classified as light, soft, weak, limber, and moderately low in shock resistance. Few hardwoods shrink as little in seasoning as aspen. It is low in decay resistance and nail-holding ability. It has little tendency to split, is easily worked with hand or power tools, and is fairly easy to finish to a smooth surface. It glues easily and ranks with the best of the hardwoods in paintability.

Uses — Higher grades of aspen are used primarily for lumber and wooden matches. Lower grade lumber is used largely for boxes and crates. Most aspen wood goes into pulp for the manufacture of book and magazine paper, and corrugated and insulating boards. It is preferred for high-grade excelsior. In recent years it has been approved for studs.

SWEET BIRCH *(Betula lenta)* **leaves** are oval-to-oblong, 2½-6 inches long, and sharply-toothed. Stems of the leaves are hairy, and tufts of hair occur in the axils of the veins on the undersides of the leaves. The **fruit** is oblong, erect, scaly, about 1-1½ inches long, and ½-inch thick. The **tree** prefers rich uplands, extending down the Appalachian Mountain chain into northern Georgia and Alabama. It reaches its largest size (around 60 feet in height) on the western slopes of the southern Alleghany Mountains. The **wood is** hard, heavy, and close-grained. It is used in furniture manufacture. Aromatic oils and flavorings are obtained from the wood, bark, and sap of this tree.



QUAKING ASPEN



QUAKING ASPEN
(approximately half-size)

SWEET BIRCH

YELLOW BIRCH *(Betula alleghaniensis)* is named for its **bark** which has a yellowish-bronze color and peels into long, ragged, horizontal strips. **Leaves** are 3-5 inches long, pointed, sharply-toothed, and roughly oblong-oval. The **fruit** is an oval, erect strobile 1-1½ inches long and about ¾-inch thick. The **tree** may grow to 100 feet in height and 3 feet in diameter. It thrives in hilly terrain; in the southern Appalachians it is almost always found above 3,000 feet elevation. The tree furnishes browse for deer, and its buds and catkins are food for grouse and other wildlife.

THE WOOD OF YELLOW BIRCH

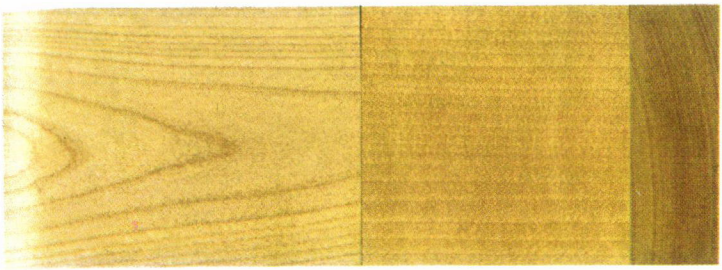
Properties — Yellow birch is heavy, hard, strong, stiff, and with very high shock resistance. Shrinkage is large during seasoning, and the wood has low decay resistance. The wood is difficult to work with handtools, but can be readily shaped by machine. It is high in nail-holding ability. It has pleasing grain pattern and takes a high polish.

Uses — Yellow birch is often mixed with hard maples, and used for lumber, veneer, distilled products, and crossties. The lumber and veneer go mostly into furniture, boxes, baskets, crates, woodenware, interior finish, and millwork. Yellow birch is one of the principal woods used for hardwood distillation for wood alcohol, acetate of lime, charcoal, tar, and oils. It is also used for pulpwood and slack cooperage.

RIVER BIRCH *(Betula nigra)* **leaves** are roughly oval, pointed, 1½-3 inches long, with doubly-toothed margins. The **tree** prefers banks of streams, ponds, and swamps where the soil is deep and rich and often flooded for part of the year. It will grow to heights of 80 feet and diameters of 3 feet or more. The crown is irregular, picturesque, and divided where the arching limbs spread from the main trunk. The **fruit** (strobile) is cylindrical, 1-1½ inches long, ½-inch thick, and grows erect. The **wood** is quite hard, and used in the manufacture of furniture and other products where its close-grained properties make it valuable.

to 80 ft.

YELLOW BIRCH



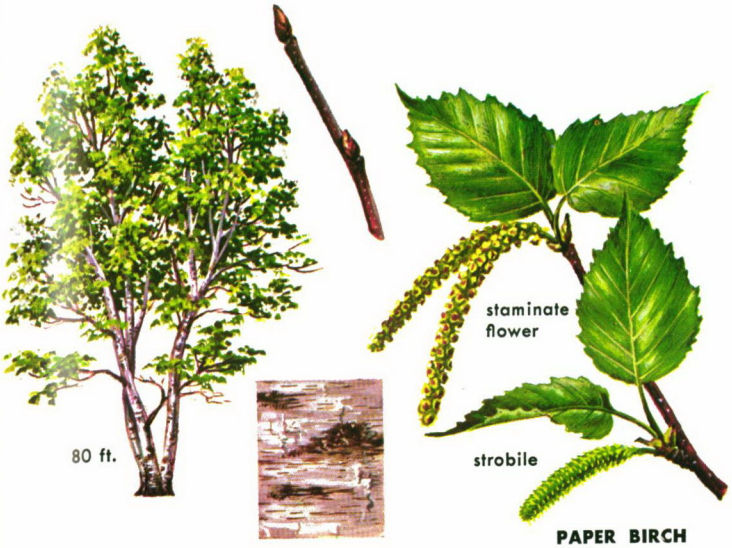
YELLOW BIRCH
(approximately half-size)

to 80 ft.

RIVER BIRCH

PAPER BIRCH *(Betula papyrifera)* is a tree of the northern forests, where it is conspicuous for the white, papery **bark** on the trunks of mature trees. The bark often peels horizontally into long strips that are curled and ragged at the ends. This is the species utilized by Indians in making their legendary birch-bark canoes. The **leaves** of paper birch are pointed and doubly toothed, roughly oval, rounded at the base, and 2-3 inches long. The **fruit** is cylindrical, about 1½ inches long and ½ inch in diameter, and hangs from a slender stalk. This fruit (strobile) disintegrates when mature. The **tree** is usually slender and graceful, often growing in clumps of 2-4 individuals. It attains heights of 80 feet with trunk diameters seldom more than 2 feet. The crown is usually rounded and irregular. Paper birch grows in the South only in North Carolina, occurring there in the balsam-spruce forests at the very highest elevations. The **wood** of paper birch is hard, light, strong, and very close-grained. It is used for veneer, spools, bobbins, toothpicks, and pulpwood.

GRAY BIRCH *(Betula populifolia)* **leaves** are nearly triangular, long-pointed, 2½-3 inches long, and have coarse-toothed margins. The **tree** is short-lived, rarely attaining heights above 20-30 feet and trunk diameters more than 18 inches. The **bark** is dull chalky-white on the outer surfaces, and bright orange on the inner surface. The bark, with its fairly prominent horizontal markings (lenticels) resembles that of paper birch but does not peel readily. The tree is able to establish readily on poor soils and is often one of the first species to invade open lands. Gray birch, like paper birch, has very limited distribution in southern states. It is found in localized areas in the mountains in North Carolina and one area of Virginia. The **wood** is light, soft, and not strong, being used for pulpwood, spools, and fuel.



PAPER BIRCH

GRAY BIRCH

WILLOWS *(Salix)*

There are more than 200 species of willows *(Salix)* distributed widely throughout the north-temperate zones of the world; about 70 are native to North America. Many of these are shrubs, and only 38 species reach tree size in the United States. Only black willow is important for lumber.

Willow **leaves** are deciduous, alternate, and typically long and narrow. They have finely toothed or smooth edges.

The **flowers** are borne in erect catkins in spring, usually before the leaves appear. The several species which bear the soft, downy catkins that are the familiar harbingers of spring are commonly called "pussy willows." A number of willows are planted as ornamentals.

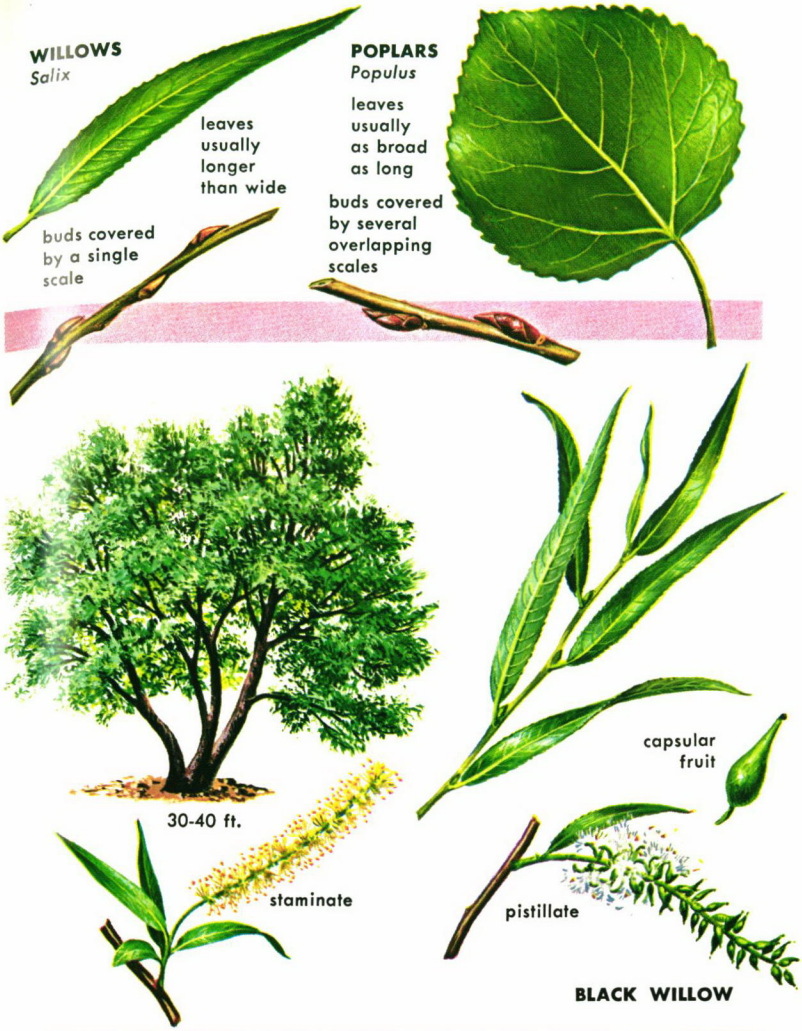
The many species of willow are so similar that it takes a trained botanist to make precise identification. The **woods** of willow trees are also very similar, and often mixed together for pulpwood and other products.

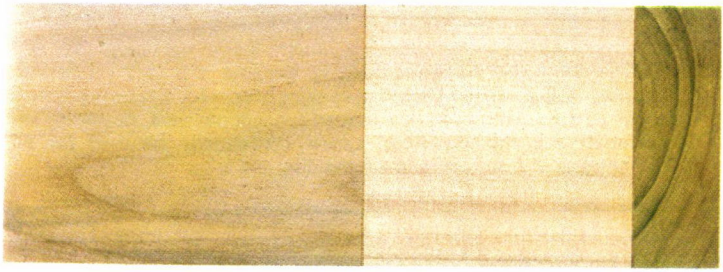
BLACK WILLOW *(Salix nigra)* is one of the largest of the native willows. Its **leaves** are long (4-6 inches) and narrow (½ to ¾-inch wide), pointed, and with finely-toothed margins. Black willow will grow on almost any soil but its shallow, wide-spreading roots need an abundant and continuous supply of moisture during the growing season. On the best sites in the Mississippi Valley, the **tree** will grow to 140 feet in height and 4 feet in diameter. Usually the tree will be 30-40 feet high, often with several stems clustered, and the thick spreading branches forming a broad, irregular crown. Trunks are often twisted, curved, or leaning.

THE WOOD OF THE WILLOWS

Properties — The various species of willow yield woods that share much the same appearance and properties. The wood is moderately light to light, moderately soft, very weak, high in shock resistance, low in nail-holding ability, but not easily split while nailing. Willow works well with tools, glues well, and takes and holds stains and finishes well. It has large shrinkage during drying, and is very low in durability.

Uses — Willow wood is used in boxes and crates, in furniture as core stock, for slack cooperage, and for woodenware and novelties. A specialty use is for artificial limbs. It finds common usages with cottonwood lumber, and the two are sometimes sold mixed at the mill.





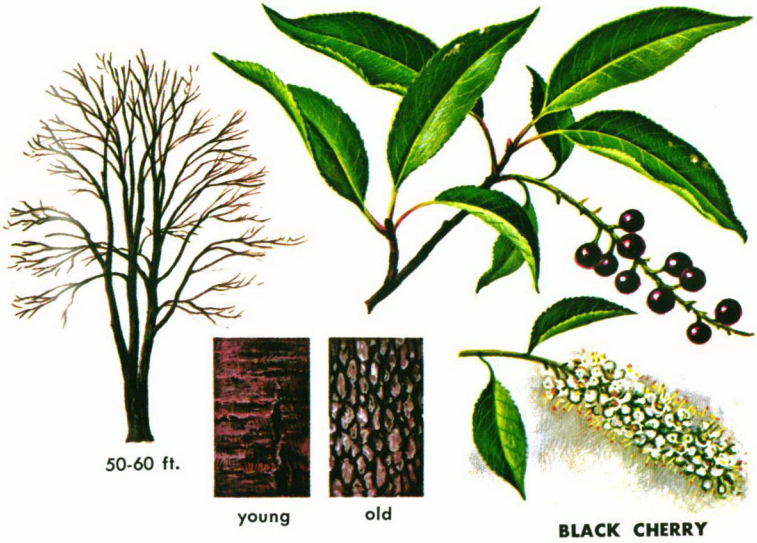
WILLOW
(approximately half-size)

BLACK CHERRY *(Prunus serotina)* has deciduous **leaves** 2-6 inches long and ½ to ¾-inch wide, narrowly-oval or oblong, and pointed. Leaf edges are finely-toothed with incurving teeth. The white **flowers** bloom when the leaves are about half grown, occurring on racemes 4-6 inches long. As the **fruit** develops the racemes gradually droop as the berries reach full size (1/3 to 1/2-inch diameter). The cherries are dark red when they are fully developed, turning black with dark purple flesh as they ripen. They are food for wild animals and birds. Black cherry is the largest of the native cherries of the United States, and the only one of commercial value. The **tree** reaches 60 feet (sometimes more) in height and 3 feet or more in diameter. It grows on all kinds of sites except those that are very swampy or extremely dry. The **bark** on branches and on the trunks of young trees is thin, satiny, reddish brown, and with horizontal markings made up of patches or rows of lenticels. **Bark** on older trees is in small scaly plates with edges slightly upraised. The bark, twigs, and foliage of black cherry are bitter and astringent, as they are on all cherries. Black cherry is an intolerant species, which means that it will not survive for long when in competition with other trees for sunlight. It becomes established only in forest openings, and is typical of the many species of forest trees that can be regenerated only when all of the vegetation is cut on the area designated.

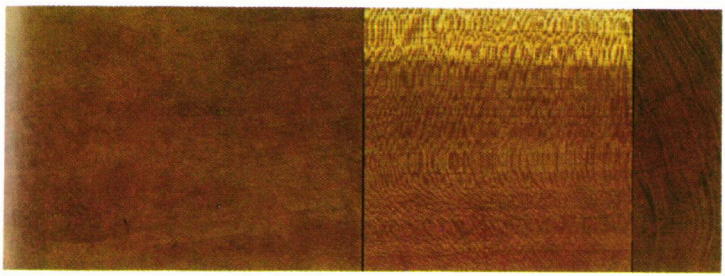
THE WOOD OF BLACK CHERRY

Properties — Black cherry is stiff and strong, with high resistance to shock, but is only moderately hard and heavy. Black cherry wood stays in place well after seasoning, and is comparatively free from checking and warping. It is difficult to work with handtools, but has excellent bending strength. It can be glued satisfactorily.

Uses — Nearly all black cherry harvested is sawed into lumber that is remanufactured into a variety of valuable products. Some of the highest-quality furniture on the market is made from solid cherry wood. It is also made into veneers that utilize and display the exceptionally attractive color and grain on less-expensive furniture. The wood has a distinctive light-to-dark reddish-brown color, and often has grain patterns that are quite striking. Because it is very stable after seasoning, it is preferred for use as backing blocks for electrotype plates and in pattern-making. It is also used for woodenware, novelties, and interior finishes for buildings. Lower grades may be used for the interior parts of furniture, and for molding and trim.



BLACK CHERRY



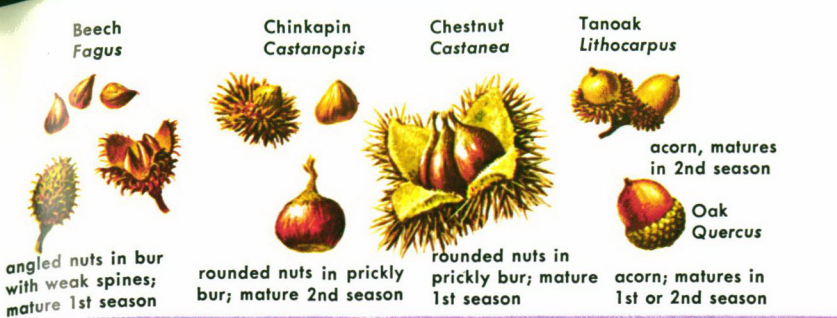
BLACK CHERRY
(approximately half-size)

AMERICAN BEECH *(Fagus grandifolia)* has deciduous oblong-ovate, pointed **leaves** 2-6 inches long, mostly grouped toward the ends of the branches on short branchlets. Leaf margins have small teeth that curve inward. Leaves turn bright yellow in autumn, later turning to a light tan color and often remaining on the tree until spring. The edible **nuts** are triangular in shape, about ¾-inch long, and borne in 2's and 3's in prickly husks that often remain on the tree into winter after the nuts have fallen (after first frost, September-November). The nuts are an excellent food for many wild birds and animals, but good seed crops occur erratically. The **tree** generally grows to about 60-80 feet in height and 2-3 feet in diameter, attaining best growth on alluvial bottomlands on moist soils. The crown is broad and rounded. The trunk is usually short, with light-steel-gray surface that is usually blotched. Beech is highly regarded as an ornamental tree because of the beautiful mottled **bark** and generally pleasing shape. It is free from diseases, and quite long-lived. The smooth, light-colored bark is apparently an irresistible challenge to carvers of initials, hearts, names, and dates which remain to deface the otherwise attractive trunk throughout the life of the tree.

THE WOOD OF AMERICAN BEECH

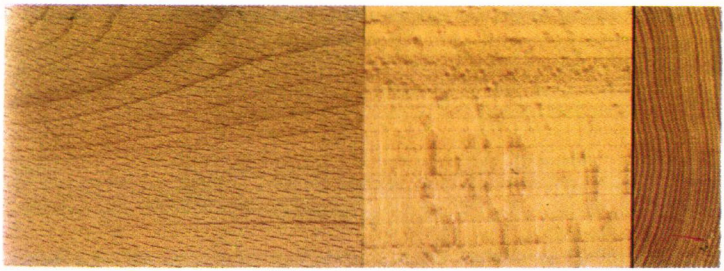
Properties — The wood of American beech is strong, heavy, shock resistant, and readily bent when steamed. It wears well and remains smooth under friction. It has good nail-holding capacity but has a tendency to split when nailed. It yields short-fibered pulp that is good for paper manufacture when it is mixed with other, longer-fibered pulps. The wood is very difficult to work with tools, and is difficult to kiln-dry (losses to checking and case-hardening may run 30%). Beech is readily distinguishable from other native species by its weight (heavier than most hardwoods), conspicuous rays, and tiny pores.

Uses — American beech is used for lumber, veneer, ties, pulpwood, slack cooperage, and fuel. The lumber is remanufactured into boxes, crates, baskets, furniture, handles, flooring, millwork, novelties, and food containers. Beech is especially good for containers since it does not impart taste or color to the contents. In furniture, it is used in cheap, unfinished pieces, bent stock, and chair backs and rungs.



COMPARISON OF NUTS IN THE BEECH FAMILY

AMERICAN BEECH



AMERICAN BEECH
(approximately half-size)

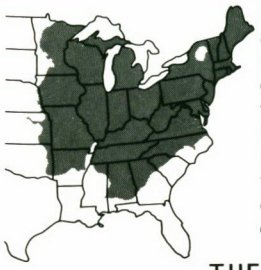
OAKS *(Quercus)*

Taken together, the oaks represent one of the most important hardwood segments of eastern forests. They provide high-grade **wood** for furniture, flooring, veneer, and many other products useful and beautiful. Their **fruit** is the acorn, which is extremely valuable as wildlife food. It is the primary overwintering food source for most forest game species in the South. Acorns are eaten by deer, turkey, ruffed grouse, quail, bear, boar, and some songbirds. The **trees** are often decorative, and preferred by many homeowners as shade trees. In the fall, oaks add rich reds, browns, and russet colors to the autumn foliage display. Some species are deciduous, some are evergreen, and a few may be either depending on local conditions of site and weather.

Oak species are separated into two major groups: red oaks and white oaks. Generally the red oaks will have **leaves** with pointed lobes that are often tipped with bristles or spines. Red oak **acorns** are generally bitter, and require two years to mature. **Leaves** of white oak usually have rounded lobes. White oak **acorns** are not bitter, and mature in one season. The inside of the shell of the red oak acorn is hairy; white oak acorns are hairless inside.

All of the oaks have alternate leaves. Twigs usually have clusters of buds at the tips. Both sexes of **flowers** are borne on the same tree; the staminate flowers occur in rather showy pendants in early spring, clustered near the ends of the twigs.

RED OAK GROUP



NORTHERN RED OAK *(Quercus rubra)* **leaves** are 5-8 inches long and have 7-11 lobes. Each lobe is usually 3-toothed, sharply pointed, and with bristles on the points. Leaves are deciduous, turning red before they fall in autumn. The **tree** will reach 60-80 feet in height and 3 or more feet in diameter. The **acorns** are usually about an inch long with a flat, shallow cup at the base. The crown of the tree is usually rounded and comparatively narrow. The species is often planted as ornamental or shade tree.

THE WOOD OF THE RED OAKS

Properties — Wood of the oaks in the red oak group is similar to that of the white oaks. A major difference is that red oak (meaning the wood of all species in the red oak group) is extremely porous, and therefore not suitable for such uses as tight cooperage. The wood is heavy, hard, stiff, and has high shock resistance. It undergoes large shrinkage during seasoning. It is above average in all machining operations except shaping. The heartwood is low in decay resistance.

Uses — Wood of the red oaks is used for flooring, slack cooperage, furniture, millwork, boxes, crates, caskets, timbers, handles, coffins, pallets, agricultural implements, boats, and woodenware. The hardness and resistance to wear of red oak, plus its beauty, make it preferred for flooring for residences. When preservative-treated, red oak is used extensively for crossties, mine timbers, and fence posts.

most with rounded lobes

acorns sweet, mature in 1st season

WHITE OAKS

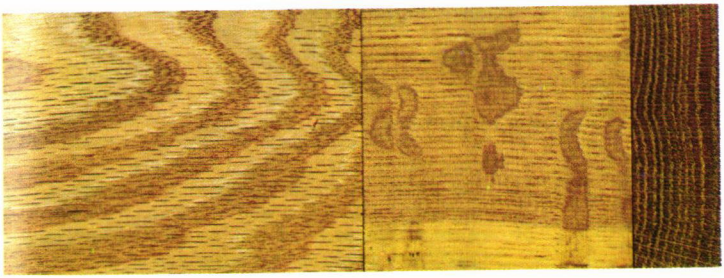
most with spiny, pointed lobes

acorns mostly bitter; mature in 2nd season

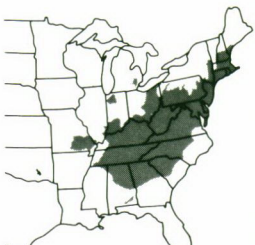
RED OAKS

70 ft.

NORTHERN RED OAK

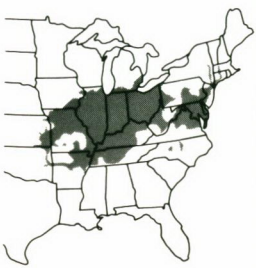


RED OAK
(approximately half-size)



SCARLET OAK *(Quercus coccinea)* has **leaves** 5-8 inches long as does the northern red oak. However, the leaves of the scarlet oak have 5-9 pointed lobes deeply separated by wide sinuses that reach almost to the midrib. Lobes are toothed and pointed. In the fall leaves turn brilliant scarlet. The **acorn** is ½-1 inch long, oval, and enclosed one-half to one-third of its length in the deep, bowl-like cup. The exposed end of the acorn is often marked with circular lines. The **tree** grows 70-80 feet high and has comparatively small branches that spread to form a rather narrow, open, irregular crown.

SHUMARD OAK *(Quercus shumardii)* **leaves** are deciduous, 6-8 inches long, and have 7-9 toothed lobes that are separated by deep, rounded sinuses. Leaves are sharply-pointed. The **acorn** is ¾ to 1¼ inches long, oval, and has a thick scaly cup that is flat and saucer-like. The **tree** grows quite large, especially in bottomlands where it reaches a height of 100 feet or more with a trunk diameter of 4-5 feet. Its shape is characterized by a clear trunk and spreading crown.



PIN OAK *(Quercus palustris)* **leaves** are divided into 5-7 lobes by wide, deep sinuses which are rounded at the bottom. The lobes are toothed and sharply-pointed. Leaves turn red or scarlet in autumn, and are deciduous. The **acorn** is quite round, about ½-inch in diameter, light brown and striated, with a thin, scaly, saucer-shaped cup. The **tree** grows to 70-80 feet in height, but may reach 120 feet in crowded stands. The trunk, often reaching 3 feet or more in diameter, is covered with smooth, light gray-brown **bark.** This species prefers deep, moist, rich soils such as those in bottomlands and the borders of swamps. **Wood** from pin oak takes special handling in drying as it tends to split and check.

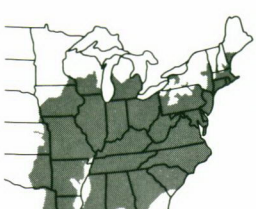
NUTTALL OAK *(Quercus nuttallii)* is a species of limited range, being native only to the mid-south states bordering or near the Mississippi River. **Leaves** are separated by deep sinuses into 5-7 broad lobes that are toothed and pointed. Leaves are deciduous. The **tree** prefers moist bottomland soils where it attains heights of 60-80 feet and trunk diameters of 3 feet or more. The **acorn** is oval, roughly an inch long, and has a fairly deep cup that is quite thick and scaly.

SCARLET OAK

SHUMARD OAK

PIN OAK

NUTTALL OAK



BLACK OAK *(Quercus velutina)* is one of the commonest oaks of the dry gravelly uplands in eastern forests, often forming a large portion of the hardwood stands in the Appalachian foothills. The **leaves** are variable in form, generally have 7 lobes (may have 5), sometimes being divided nearly to the midrib by rounded sinuses. Lobes are toothed and usually taper from a broad base. The **acorn** is oval or rounded, ½-¾ inch long, and enclosed for about half its length in a deep, scaly, bowl-shaped cup. The **tree** reaches 50-70 feet in height, and 3 feet or more in diameter. In early spring the unfolding leaves are a deep red, turning silvery within a few days. **Bark** on the trunks of old trees is usually thick, black, and deeply divided into broad, rounded ridges. The crown is usually rounded.

SOUTHERN RED OAK *(Quercus falcata)* has deciduous **leaves,** 5-9 inches long, with 3-7 lobes deeply separated by rounded sinuses. The central (terminal) lobe is considerably longer than the others, and quite narrow by comparison. **Acorns** are rounded, with a scaly cup that covers about one third of the fruit.

This species is divided into two varieties: *Q. falcata* var. *falcata* (called "typical" southern red oak), and *Q. falcata* var. *pagodaefolia* (called cherrybark oak). Southern red oak (var. *falcata*) is an upland tree occurring on dry ridgetops and slopes facing south and west. It is usually on dry, sandy, or clay soils. Cherrybark oak occurs mostly on bottomlands and on well drained terraces such as found along streams, and is characteristically a lowland species.

Southern red oak will grow to 60-80 feet in height, with diameters of 2-3 feet. Cherrybark oak will often attain heights of 100-130 feet and diameters of 3-5 feet. Cherrybark oak is one of the hardiest and fastest growing of the bottomland oaks.

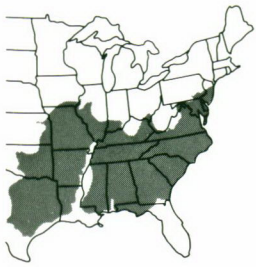
SWAMP CHESTNUT OAK *(Quercus michauxii)* **leaves** are roughly oval, 6-8 inches long, 3-5 inches wide, and coated on the underside with thick silvery-white fuzz. Leaf margins are coarsely toothed. The **acorn** is 1-1½ inches long, ovoid, and one-third covered by a thick cup that has rough scales. The **tree** usually grows to 60-80 feet in height, but may attain 100 feet. The trunk is often free of branches for 50-60 feet. Stout branches ascend at sharp angles to form a round-topped crown. The **wood** is hard, tough, very strong, and heavy. It is used in slack cooperage, construction, flooring, and implements. It is very difficult to kiln-dry.

BLACK OAK

60-80 ft.

SOUTHERN RED OAK

SWAMP CHESTNUT OAK



BLACKJACK OAK *(Quercus marilandica)* **leaves** are up to 7 inches long, leathery, and with the underneath surfaces quite hairy and of a brownish color. The deciduous leaves have many shapes, but commonly are much broader at the end than at the base, with three ill-defined large lobes at the apex. **Acorns** are less than an inch long, oblong, and about half covered by the thick, scaly cup. The **trees** rarely grow larger than 20-30 feet in height, are of scraggly form, and not of high value as a timber species. The **wood** does make excellent charcoal, and is used commercially for this product.

WATER OAK *(Quercus nigra)* **leaves** are small (2-4 inches long) and considerably broader at the apex than at the base. Leaves are variably shaped but usually show three indistinct lobes. They are deciduous, but remain on the tree into early winter. The **acorn** is small, usually ½-inch or less in length, and almost black. Water oak is a bottomland species but will grow on upland soils also. On good sites the **tree** has a slender, straight trunk, and reaches a height of 125 feet or more. The species is easily damaged or killed by fire. The **wood** is not considered good for finished lumber because it checks and splits excessively when drying, but is utilized for rough construction lumber and uses such as shoring where strength is of first importance.

LAUREL OAK *(Quercus laurifolia)* is usually found on sandy soils, quite often along the edges of rivers and swamps. Its **leaves** are semi-deciduous, which means that the current year's leaves remain on the tree while those of the previous year will fall. Leaves are small, 2-4 inches long, pointed, and sometimes with rather unevenly-lobed edges. **Acorns** are small (½-inch long), dark colored, with a flat saucer-shaped cup that is covered with hairy scales. Laurel oak grows rapidly, maturing in about 50 years. On good sites the **tree** may reach 100 feet in height and 3-4 feet in diameter. It has been widely used as an ornamental.

BLACKJACK OAK

WATER OAK

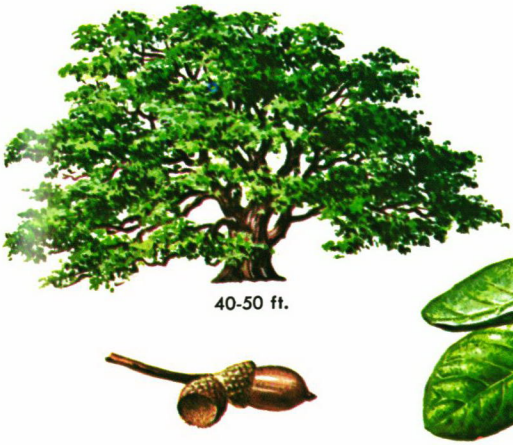
LAUREL
OAK

WILLOW OAK *(Quercus phellos)* is named for its willow-like **leaves** which are deciduous. They are 2-5 inches long, narrow, smooth-edged, and tipped with bristle points. The round **acorns** are small (½-inch long) with a thin, flat, scaly cup. The best quality **trees** grow on bottomland soils where they frequently become 80-100 feet tall with diameters 3 feet and more. It may be almost evergreen in the southermost portions of its range. The trunk is usually short and covered with blackish, deeply furrowed bark. The small branches spread into an attractive crown that is comparatively narrow and often conical with a round-topped head. Willow oak makes a good ornamental tree, and is planted as a shade tree in southern communities.

LIVE OAK *(Quercus virginiana),* with its wide-spreading crown and gnarled branches festooned with Spanish moss is one of the most characteristic trees of the coastal region of the Deep South. Live oak, as the name implies, is evergreen. The **leaves** are quite small (2-5 inches long), oval with rounded ends, and have margins that are mostly smooth but may be slightly toothed. The dark-colored **acorn** is about an inch long, slender, and tapered. The cup encloses about a third of the fruit, is tapering, and quite scaly. Although this is one of the "red oaks," its acorns are not bitter, and mature in one year instead of two. The **tree** seldom grows to more than 50 feet in height, but may have a crown-span of 150 feet or more. Open-grown trees may have trunk diameters of 6-7 feet. The **wood** is extremely difficult to saw and dry. It was prized for blocks on sailing ships.

80-100 ft.

WILLOW OAK



40-50 ft.

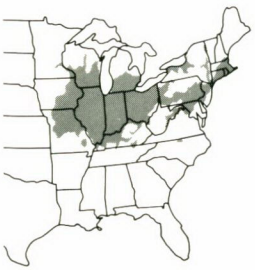
LIVE OAK

WHITE OAK *(Quercus alba)* has deciduous **leaves** 5-9 inches long with 7-9 rounded lobes. The depth of the sinuses separating the lobes varies, almost reaching the midrib in some cases. The base of the leaf narrows abruptly to become wedge-shaped at the stem. The **acorn** is about ¾-inch long, light chestnut-brown, enclosed about one-fourth of its length in a bowl-shaped cup that is covered with rough scales that are joined at their bases to form small knobs. The **tree** reaches 80-100 feet in height and 3-4 feet in trunk diameter. In the open, white oak develops a rounded spreading crown; in forest stands it has a tall, clear stem and smaller crown. Growth is good on all but the driest, shallow soils, but is best on deep, well-drained loamy soils.

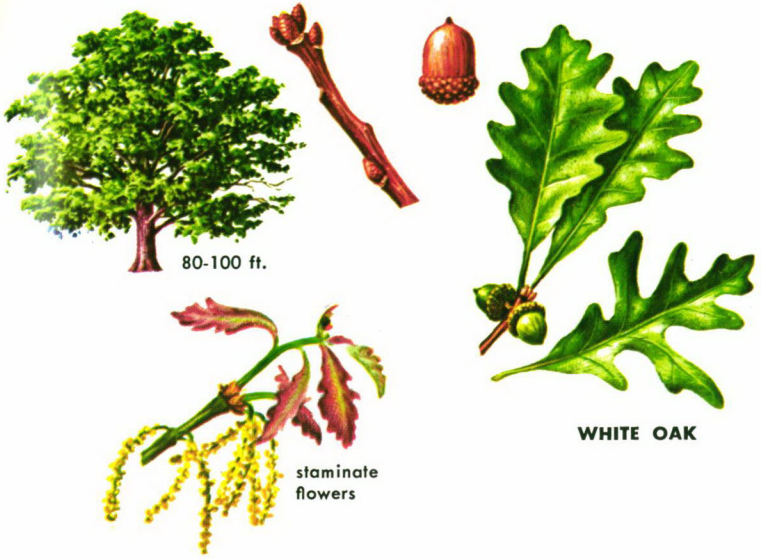
THE WOOD OF THE WHITE OAKS

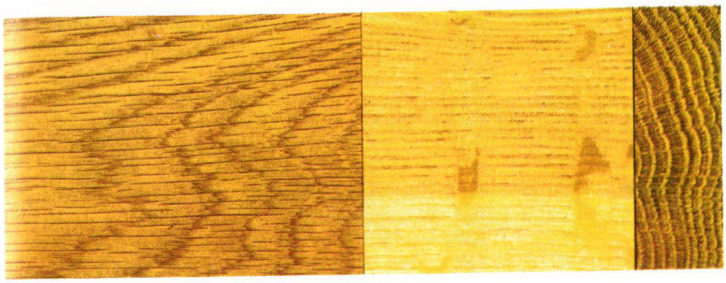
Properties — All of the white oaks are heavy, very hard, and strong. The wood is subject to large shrinkage during seasoning, and extra care must be taken to avoid checking and warping. Pores of the heartwood are impervious to liquids, making white oak the only successful wood for use as tight cooperage. Large amounts of higher grades are used for bourbon barrels. The heartwood is comparatively decay resistant, more so than that of red oaks. White oaks are above average in all machining operations except shaping. All oaks in the white oak group share just about the same properties and uses.

Uses — Most white oak is made into lumber for flooring, furniture, tight cooperage, millwork, timbers, handles, boxes, and crates. Perhaps the largest amounts go into high-quality flooring, barrels, kegs, and casks. It is prized for use in construction of ships and boats.

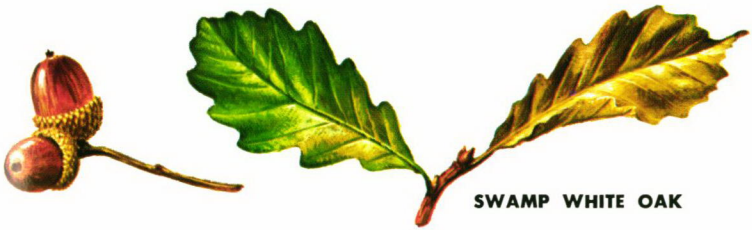


SWAMP WHITE OAK *(Quercus bicolor)* **leaves** are deciduous, 5-6 inches long, and with margins that have bluntly-pointed lobes of varying size and depth. Undersides of leaves are hairy. Leaves are roughly oval, broader near the apex and tapering to the base. **Acorns** grow usually in pairs on a fairly long stem (1-4 inches). Acorns are oval, about one inch long, with about a third of their length enclosed in the scaly cup. This species is commonly found on wet sites and on areas subject to flooding. On good sites, the **tree** grows quite rapidly, normally attaining heights of 60-70 feet and diameters of 2-3 feet. Some trees have been reported that were 100 feet tall and 7 feet in diameter.

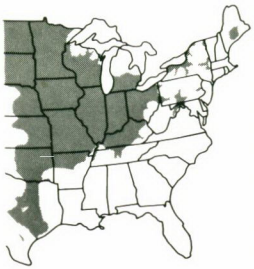




WHITE OAK
(approximately half-size)



CHESTNUT OAK *(Quercus prinus)* **leaves** are deciduous, roughly-oval but often wider near the apex, and roughly-toothed. Undersides of leaves are often hairy. The shiny **acorn** is oval and 1-1½ inches long. The cup is thin and covered with fused scales. The **tree** reaches maximum size and quality on mountain slopes of the Carolinas and Tennessee, where it may reach heights of 100 feet and diameters of 6 feet. Although it is common on dry, rocky soils, it grows best in well-drained coves and bottomlands. As with most white oaks, growth is slow on almost all sites. It tends to form pure, open stands on the poorer sites of hillsides and mountain slopes, but usually is mixed with other species such as hickories, other oaks, and pitch pine on better sites. This species is a source of tannin extract (used for tanning of leather, dyeing, etc.), giving the tree another common name: tanbark oak.



BUR OAK *(Quercus macrocarpa)* has deciduous **leaves** that are somewhat wedge-shaped, divided into 5-7 lobes by wide sinuses reaching sometimes almost to the midrib. The lobes are rounded, comprising a leaf that is quite large (6-12 inches long and 3-6 inches wide). The **acorn** is oval or broadly ovate, broad at the base and rounded at the depressed apex. The acorn is from ¾ to 1½ inches long, and half covered in the fringed cup that gives the species its common name. Twigs sometimes develop corky "wings" 1-1½ inches wide. The **tree** is a relatively slow grower; it is one of the most drought-resistant of the oaks, and does well on exposed sandy sites. On better sites, it reaches 100 feet in height and 3-4 feet in diameter. It is said to have reached a height of 170 feet and diameter of 7 feet in the Ohio Valley.

SWAMP CHESTNUT OAK *(Quercus michauxii)* **leaves** are roughly oval, 6-8 inches long, 3-5 inches wide, and coated on the underside with thick silvery-white fuzz. Leaf margins are coarsely toothed. The **acorn** is 1-1½ inches long, ovoid, and one-third covered by a thick cup that has rough scales. The **tree** usually grows to 60-80 feet in height, but may attain 100 feet. The trunk is often free of branches for 50-60 feet. Stout branches ascend at sharp angles to form a round-topped crown. The **wood** is hard, tough, very strong, and heavy. It is used in slack cooperage, construction, flooring, and implements. It is very difficult to kiln-dry.

50-60 ft.

CHESTNUT OAK

BUR OAK

SWAMP CHESTNUT OAK

POST OAK *(Quercus stellata)* has deciduous **leaves** deeply divided into 5 lobes by broad sinuses. The central-lateral lobes are roughly squarish on the ends. The oval **acorn,** ½ to ¾-inch long, is about one-third covered by the bowl-shaped or saucer-shaped scaly cup. The **tree** has a wide range and grows on a variety of soils and sites. Height and diameter growth are slow, and only rare specimens reach 100 feet in height and 2-3 feet in diameter. The **tree** often has stout branches that spread to form a dense, round-topped crown. The branches and upper stem are often twisted and gnarled. The heartwood is very heavy, hard, close-grained, and durable in contact with the soil. It has been widely used for fenceposts, hence its common name.

CHINKAPIN OAK *(Quercus muehlenbergii)* has deciduous, oblong **leaves,** 4-7 inches long, with pronounced marginal teeth that are quite pointed for a member of the white oak group. The dark-colored **acorn** is round-oval, about ¾-inch long, and half enclosed in the scaly cup. On better sites, the **tree** grows to 60-80 feet tall, and has diameters of 2-3 feet. Chinkapin oak is not common throughout most of its range, and therefore not of great commercial importance. Its **acorns** were used by Indians to make "acorn flour and meal." Many forms of wildlife enjoy the sweet acorns.

OVERCUP OAK *(Quercus lyrata)* **leaves** are deciduous, 6-10 inches long, and separated into 5-9 rounded lobes by deep or shallow sinuses. Leaves gradually narrow to the base, making this basal portion wedge-shaped. **Acorns** are ½ to 1 inch long and have a somewhat flattened spherical shape, usually broader at the base than long, and almost or entirely covered by the scaly cup (hence the common name of the species). Overcup oak is found on bottomlands, most commonly on the lower poorly drained first bottoms and terraces. While the **tree** will grow to 60-90 feet in height, it will usually be smaller. The form and quality of the tree vary greatly throughout its range; it will often be short and crooked.

40-50 ft.

POST OAK

CHINKAPIN OAK

OVERCUP OAK

INDEX

Abies balsamea, 22
fraseri, 22
Acer negundo, 32
nigrum, 34
rubrum, 32
saccharinum, 32
saccharum, 30
Aesculus glabra, 40
octandra, 38
American basswood, 66
American beech, 90
American elm, 68
American holly, 66
American sycamore, 56
Ashes (general description), 34
Ash, Black, 36
Green, 38
Pumpkin, 38
White, 34
Aspen, Bigtooth, 78
Quaking, 80
Atlantic white-cedar, 26
Baldcypress, 8
Balsam fir, 22
Balsam poplar, 78
Basswood, American, 66
Carolina, 68
White, 68
Beech, American, 90
Betula alleghaniensis, 82
lenta, 80
nigra, 82
papyrifera, 84
populifolia, 84
Bigtooth aspen, 78
Birch, Gray, 84
Paper, 84
River, 82
Sweet, 80
Yellow, 82
Bitternut hickory, 46
Black ash, 36
Black cherry, 88
Blackjack oak, 98
Black locust, 52
Black maple, 34
Black oak, 96
Black spruce, 24
Black tupelo, 64
Black walnut, 40
Black willow, 86
Boxelder, 32
Buckeye, Ohio, 40
Yellow, 38
Bur Oak, 104
Butternut, 42
Carolina basswood, 68
Carya aquatica, 44
cordiformis, 46
glabra, 48
illinoensis, 44
laciniosa, 46
myristicaeformis, 46
ovata, 48
tomentosa, 46
Cedar elm, 72
Celtis laevigata, 74
occidentalis, 74
Chamaecyparis thyoides, 26
Cherry, Black, 88
Chestnut oak, 104
Chinkapin oak, 106
Common persimmon, 62
Cornus florida, 28
Cottonwood, Eastern, 76
Swamp, 78
Cucumbertree, 62
Diospyros virginiana, 62
Dogwood, Flowering, 28
Eastern cottonwood, 76
Eastern hemlock, 22
Eastern redcedar, 28

INDEX

Eastern white pine, 10
Elm, American, 68
  Cedar, 72
  Rock, 72
  Slippery, 70
  Winged, 70
Fagus grandifolia, 90
Fir, Balsam, 22
  Fraser, 22
Flowering dogwood, 28
Fraser fir, 22
Fraxinus americana, 34
  nigra, 36
  pennsylvanica, 38
  profunda, 38
Gleditsia aquatica, 50
  triacanthos, 50
Gray birch, 84
Green ash, 38
Hackberry, 74
Hemlock, Eastern, 22
Hickories (general description), 42
Hickory, Bitternut, 46
  Mockernut, 46
  Nutmeg, 46
  Pignut, 48
  Shagbark, 48
  Shellbark, 46
  Water, 44
Holly, American, 66
Honeylocust, 50
Ilex opaca, 66
Jack pine, 12
Juglans cinerea, 42
  nigra, 40
Juniperus silicicola, 28
  virginiana, 28
Larix laricina, 20
Laurel oak, 98
Liquidambar styraciflua, 56
Liriodendron tulipifera, 58
Live oak, 100
Loblolly pine, 16
Locust, Black, 52
Longleaf,pine, 16
Maclura pomifera, 54
Magnolia acuminata, 62
  grandiflora, 60
Magnolia, Southern, 60
Magnolia virginiana, 60
Maples (general description), 30
Maple, Black, 34
  Red, 32
  Silver, 32
  Sugar, 30
Mockernut hickory, 46
Morus rubra, 54
Mulberry, Red, 54
Northern red oak, 92
Northern white-cedar, 26
Nutmeg hickory, 46
Nuttall oak, 96
Nyssa aquatica, 64
  sylvatica, 64
Oaks (general description), 92
Oak, Black, 96
  Blackjack, 98
  Bur, 104
  Chestnut, 104
  Chinkapin, 106
  Laurel, 98
  Live, 100
  Northern red, 92
  Nuttall, 96
  Overcup, 106
  Pin, 94
  Post, 106
  Scarlet, 94
  Shumard, 94
  Southern red, 96
  Swamp chestnut, 104
  Swamp white, 102
  Water, 98
  White, 102
  Willow, 100

INDEX

Ohio buckeye, 40
Osage-orange, 54
Overcup oak, 106
Paper birch, 84
Pecan, 44
Persimmon, Common, 62
Picea glauca, 26
  mariana, 24
  rubens, 24
Pignut hickory, 48
Pines (general description), 10
Pine, Eastern white, 10
  Jack, 12
  Loblolly, 16
  Longleaf, 16
  Pitch, 12
  Pond, 18
  Red, 12
  Sand, 20
  Shortleaf, 14
  Slash, 14
  Spruce, 18
  Table-mountain, 18
  Virginia, 20
Pin oak, 94
Pinus banksiana, 12
  clausa, 20
  echinata, 14
  elliottii, 14
  glabra, 18
  palustris, 16
  pungens, 18
  resinosa, 12
  rigida, 12
  serotina, 18
  strobus, 10
  taeda, 16
  virginiana, 20
Pitch pine, 12
Platanus occidentalis, 56
Pond pine, 18
Poplar, Balsam, 78
Populus balsamifera, 78
  deltoides, 76
  grandidentata, 78
  heterophylla, 78
  tremuloides, 80
Post oak, 106
Prunus serotina, 88
Pumpkin ash, 38
Quaking aspen, 80
Quercus alba, 102
  bicolor, 102
  coccinea, 94
  falcata, 96
  laurifolia, 98
  lyrata, 106
  macrocarpa, 104
  marilandica, 98
  michauxii, 96
  muehlenbergii, 106
  nigra, 98
  nuttallii, 94
  palustris, 94
  phellos, 100
  prinus, 104
  rubra, 92
  shumardii, 94
  stellata, 106
  velutina, 96
  virginiana, 100
Redcedar, Eastern, 28
  Southern, 28
Red maple, 32
Red mulberry, 54
Red pine, 12
Red spruce, 24
River birch, 82
Robinia pseudoacacia, 52
Rock elm, 72
Salix nigra, 86
Sand pine, 20
Sassafras, 52
Sassafras albidum, 52

INDEX

Scarlet oak, 94
Shagbark hickory, 48
Shellbark hickory, 46
Shortleaf pine, 14
Shumard oak, 94
Silver maple, 32
Slash pine, 14
Slippery elm, 70
Southern magnolia, 60
Southern redcedar, 28
Southern red oak, 96
Spruces (general description), 24
Spruce, Black, 24
  Red, 24
  White, 26
Spruce pine, 18
Sugarberry, 74
Sugar maple, 30
Swamp chestnut oak, 104
Swamp cottonwood, 78
Swamp white oak, 102
Sweetbay, 60
Sweet birch, 80
Sweetgum, 56
Sycamore, American, 56
Table-mountain pine, 18
Tamarack, 20
Taxodium distichum, 8
Thuja occidentalis, 26
Tilia americana, 66
  caroliniana, 68
  heterophylla, 68
Tsuga canadensis, 22
Tupelo, Black, 64
  Water, 64
Ulmus alata, 70
  americana, 68
  crassifolia, 72
  rubra, 70
  thomasii, 72
Virginia pine, 20
Walnut, Black, 40
Water hickory, 44
Waterlocust, 50
Water oak, 98
Water tupelo, 64
White ash, 34
White basswood, 68
White-cedar, Atlantic, 26
  Northern, 26
White oak, 102
White spruce, 26
Willows (general description), 86
Willow, Black, 86
Willow oak, 100
Winged elm, 70
Wood of:
  American beech, 90
  American elm, 70
  Ash, 36
  Baldcypress, 8
  Basswood, 66
  Black cherry, 88
  Black locust, 52
  Black tupelo, 64
  Black walnut, 40
  Cottonwood, 76
  Eastern redcedar, 28
  Hackberry, 74
  Hickories, 44
  Honeylocust, 50
  Persimmon, 62
  Quaking aspen, 80
  Red oaks, 92
  Rock elm, 72
  Southern pines, 14
  Sugar maple, (hard maples), 30
  Sweetgum, 56
  Sycamore, 58
  White oaks, 102
  Willows, 86
  Yellow birch, 82
  Yellow-poplar, 58
Yellow birch, 82
Yellow buckeye, 38
Yellow-poplar, 58

The Forest Service, U. S. Department of Agriculture, is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

FS-466
October 1991